



REQUEST FOR CEO ENDORSEMENT

PROJECT TYPE: Full-sized Project

TYPE OF TRUST FUND: GEF Trust Fund

For more information about GEF, visit TheGEF.org

PART I: PROJECT INFORMATION

Project Title: Development and promotion of non-POPs alternative to DDT			
Country(ies):	The Republic of India	GEF Project ID: ¹	4612
GEF Agency(ies):	UNIDO UNEP (select)	GEF Agency Project ID:	100115 (UNIDO) 00964 (UNEP)
Other Executing Partner(s):	Ministry of Environment and Forests (MoEF), Ministry of Health and Family Welfare (MoHF&W), Ministry of Chemicals and Fertilizers (MoCF)	Submission Date: Re-submission Date:	06/03/2014 03/11/2015
GEF Focal Area (s):	Persistent Organic Pollutants	Project Duration(Months)	60 months
Name of Parent Program (if applicable): ➤ For SFM/REDD+ <input type="checkbox"/> ➤ For SGP <input type="checkbox"/> ➤ For PPP <input type="checkbox"/>		Project Agency Fee (\$):	1,000,000

A. FOCAL AREA STRATEGY FRAMEWORK²

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount (\$)	Cofinancing (\$)
(select) CHEM-1	Outcome 1.1: Production and use of controlled POPs chemical phase out	Output 1.1.1: Countries receiving GEF support to phase out the production or use of controlled POPs (other than new POPs)	GEF TF	7,100,000	33,004,000
(select) CHEM-1	Outcome 1.5: Country capacity built to effectively phase out and reduce releases of POPs	Output 1.5.1: Countries receiving GEF support to build capacity for the implementation of the Stockholm Convention	GEF TF	2,900,000	10,143,167
(select)			(select)		
(select)			(select)		
(select)			(select)		
(select)			(select)		
(select)			(select)		
(select)			(select)		
(select)			(select)		
Total project costs				10,000,000	43,147,167

¹ Project ID number will be assigned by GEFSEC.

² Refer to the [Focal Area Results Framework and LDCF/SCCF Framework](#) when completing Table A.

B. PROJECT FRAMEWORK

Project Objective: To introduce bio- and botanical pesticides and other locally appropriate cost-effective and sustainable alternatives to DDT as first step for reduction and eventual elimination of dependency on DDT, ensuring food safety, enhancing livelihood and protecting human health and the environment.						
Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount (\$)	Confirmed Cofinancing (\$)
1. Legislation, policy framework and institutional capacity (UNEP)	TA	Efficient system fulfilling legal requirements at the various stages of the lifecycle of alternatives to DDT	1.1 Regulatory mechanism throughout the lifecycle of the alternatives to DDT in place. 1.2 Guidance documents for producers, registration holders and users on the legal requirements for alternatives to DDT developed	GEF TF	500,000	1,380,600
2. Alternatives to vector control (UNIDO)	Inv	Gradually decreased use of DDT on the basis of availability of locally appropriate cost-effective and sustainable alternatives bio-and botanical pesticides and LLIN as well as other alternatives to DDT ready for enhancement to large scale production	2.1 Existing Neem sheds scaled up for production of Neem-based botanical pesticides through PPP model 2.2 One (1) pilot Bt- based bio-pesticides production facility established in the governmental sector meeting international operational standard 2.3 Domestic LLIN production potential scaled up and operational at one (1) site in the governmental sector 2.4 Business model for alternatives developed, promoted and marketed	GEF TF	7,100,000	33,004,000
3. Promotion and propagation of new cultivars of Neem (UNIDO)	TA	Promotion of new dwarf cultivars with early maturity and higher limonoids yield for large scale cultivation	3.1 New cultivars with high yielding limonoids propagated using tissue culture technology and large scale clonal propagation	GEF TF	490,485	2,316,667

4. Development and Promotion of Intergrated Vector Pest Management (IVPM) (UNEP)	TA	Central and State Governments endorsed implementation of IVPM policies / strategies	4.1 IVPM developed, promoted and pilot tested in selected sites	GEF TF	795,825	2,845,400
5. Monitoring and evaluation of results (UNIDO / UNEP)	TA	Monitoring of project interventions and evaluation of project progress	5.1 Technical and administrative reports available at each stage of the project 5.2 Project implementation management and M&E mechanism implemented 5.3 Project evaluation	GEF TF	637,500	1,984,500
	(select)			(select)		
Subtotal					9,523,810	41,531,167
Project management Cost (PMC) ³				GEF TF	476,190	1,616,000
Total project costs						10,000,000
						43,147,167

C. SOURCES OF CONFIRMED COFINANCING FOR THE PROJECT BY SOURCE AND BY NAME (\$)

Please include letters confirming cofinancing for the project with this form

Sources of Co-financing	Name of Co-financier (source)	Type of Cofinancing	Cofinancing Amount (\$)
National Government	Ministry of Environment & Forests	In-kind	6,000,000
National Government	Ministry of Chemicals & Fertilizers/Hindustan Insecticide Limited *	(select)	17,476,000
National Government	Ministry of Health Family & Welfare /NVBDCP/NCDC/NIMR	In-kind	3,330,000
National Government	National Botanical Research Institute	In-kind	12,006,667
National Government	National Botanical Research Institute	Cash	3,500,000
GEF Agency	UNEP	In-kind	424,000
GEF Agency	UNIDO	In-kind	343,000
GEF Agency	UNIDO	Cash	67,500
(select)		(select)	0
Total Co-financing			43,147,167

**It should be noted that the Government entities partnering in this project receive their funding from the National Budget. While the co-financed project activities will require re-direction of these budget funds, separating the cash co-financing without similar provision in their national approved budget is complicated. A solution for this is being sought; meanwhile this contribution as currently labeled "in-kind" actually contains fresh budgetary resources and can be compared to the "equity" contribution type of co-financing introduced only in GEF-6. By Mid-term Evaluation a solution will be found and the contribution can be reported during the project implementation as cash co-financing to meet the ultimate objective of the project.*

³ PMC should be charged proportionately to focal areas based on focal area project grant amount in Table D below.

D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY¹

GEF Agency	Type of Trust Fund	Focal Area	Country Name/ Global	(in \$)		
				Grant Amount (a)	Agency Fee (b) ²	Total c=a+b
UNIDO	GEF TF	Persistent Organic Pollutants	Republic of India	8,300,000	830,000	9,130,000
UNEP	GEF TF	Persistent Organic Pollutants	Republic of India	1,700,000	170,000	1,870,000
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
(select)	(select)	(select)				0
Total Grant Resources				10,000,000	1,000,000	11,000,000

¹ In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table.

² Indicate fees related to this project.

F. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	Grant Amount (\$)	Cofinancing (\$)	Project Total (\$)
International Consultants	433,000	695,000	1,128,000
National/Local Consultants	586,500	2,345,000	2,931,500

G. DOES THE PROJECT INCLUDE A “NON-GRANT” INSTRUMENT? No

(If non-grant instruments are used, provide in Annex D an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF/NPIF Trust Fund).

PART II: PROJECT JUSTIFICATION

A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF⁴

1. Information presented in this document builds on those provided in the original PIF, the structure and budget of the document closely follows the project design of the PIF. In order to increase project implementation and monitoring, the original Outcome 3 (Promotion of IPM and new dwarf cultivars) has been split into two self-standing Outcomes whereby Outcome 3 (New dwarf cultivars) will be implemented under the UNIDO component of the project and Outcome 4 (Development and promotion of IVPM) will be implemented by UNEP. Throughout this document (and the project) the more precise term "integrated vector pest management (IVPM)" will be used instead of "integrated pest management (IPM)". Subsequently, the former Outcome 4 will become Outcome 5. Further, two minor amendments were made to strengthen focus of the proposed project. In Output 2.2 only Bt-based biopesticides are addressed as the Bs-based biopesticides has no relevance to the proposed project in India. In Outcome 3 instead of Integrated Pest Management (IPM) the proposed project will address Integrated Vector Pest Management (IVPM) that will strengthen the focus of the proposed project. Since this project will not develop new chemical alternatives and rather apply proven technology of pyrethroids on bednets, the outcome "support to chemical alternatives" under Outcome 2 was eliminated since the support to chemical alternatives is already contained in the LLINs.
- A.1 National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NCSA, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.
2. The Government of India (GoI) signed the Stockholm Convention on POPs in May 2002 and ratified it on 13 January 2006. India has committed to fulfill its obligations under the Convention, prepared its National Implementation Plan (NIP) and submitted it to the Secretariat of the Stockholm Convention on 21 April 2011. The National Portfolio Formulation Exercise (NPFE) was voluntarily conducted by the GoI in March 2010 using its own resources and prepared the Program Framework Document (PFD) "Support for implementation of Stockholm Convention National Implementation Plan (NIP) by addressing principal concerns of best available techniques and best environmental practices (BAT/BEP), alternatives/formulation to pesticides, industrial capacity building resulting in POPs phase out, reduction of releases and amelioration of contaminated sites." The PFD approved by the GEF Operational Focal Point of India (MoEF) on 7 October 2010, identifies six (6) projects that rank as top priority of the India NIP, among them is identifying and introducing alternatives to DDT. The objective of the project is to introduce bio- and botanical pesticides and other locally appropriate cost-effective and sustainable alternatives to DDT as first step for reduction and eventual elimination of dependency on DDT, ensuring food safety, enhancing livelihood and protecting human health and the environment.
3. According to the World Health Assembly resolution 50.13, member states are urged to initiate sustainable action related to malaria vector control to reduce the use of and dependency on DDT. In India, the National Vector Borne Disease Control Programme (NVBDCP) under the Ministry of Health and Family Welfare (MoHF&W) has been using DDT for malaria vector control on the basis of epidemiological impact and insecticide resistance. However, resistance data shows for all states in India the low susceptibility of adult mosquitoes to DDT. As a result, the quantities of DDT used for disease vector control including malaria have decreased gradually.
4. Due to the above, the GoI through the NVBDCP is enhancing its alternative vector control strategy based on Integrated Vector Pest Management (IVPM), including the following interventions: biological control; chemical control; environmental management; all in combination with legislative measures and alternative approaches. Under the NVBDCP all the components of IVPM have been introduced to reduce the reliance of DDT in public health. All efforts need further development, scale enlargement and further support.
5. In January 2011, the MoHF&W recommended the registration of Long Lasting Insecticidal Nets (LLINs) for commercial marketing in highly malaria endemic areas. It was further recommended to encourage potential local manufacturers of LLINs to produce and distribute LLINs in the country.
6. The Global Fund for Aids, Tuberculosis, Malaria (GFATM) and the World Bank (WB) have supported alternative interventions to DDT in high malaria risk areas of India.

⁴ For questions A.1 –A.7 in Part II, if there are no changes since PIF and if not specifically requested in the review sheet at PIF stage, then no need to respond, please enter "NA" after the respective question.

A.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities.

7. The project is consistent with GEF-5 POPs CHEM-1 “Phase out POPs and reduce POPs releases”, Outcome 1.1 “Production and use of controlled POPs chemicals phased out”, Output 1.1.1 “Countries receiving GEF support to phase out the production or use of controlled POPs (other than new POPs)” and Outcome 1.5 “Country capacity built to effectively phase out and reduce releases of POPs”, Output 1.5.1 “Countries receiving GEF support to build capacity for the implementation of the Stockholm Convention” through introduction and demonstration of viable, cost-effective and sustainable alternatives to eliminate dependency on DDT and other POPs chemicals. The amount of DDT not produced or used following the demonstration of alternatives will be measured in MTs per year against the baseline.

A.3 The GEF Agency’s comparative advantage:

8. **UNIDO** is within the comparative advantage matrix set out in GEF/C.31/5. UNIDO plays a leading role in the implementation of the Stockholm Convention on POPs, assisting developing countries and transition economies to meet their obligations under the Convention. The organization focuses on the provisions of the Convention that are directly related to the industrial development sector and provides technical assistance based on environmentally sustainable approaches including POPs pollution reduction/elimination, industrial process changes, modified or substitute materials and products, BAT/BEP and environmentally sound management (ESM) of POPs chemicals.
9. The organization has developed and actively implemented GEF-funded projects on industrial environmental issues where alternative, innovative and cost-effective technological solutions are required to address environmental and health problems. The proposed project will incorporate technology transfer in introducing and demonstrating cost-effective, socially acceptable and environmentally sustainable non-POPs alternatives to DDT and other POP chemical of similar use, which clearly in the comparative advantage domain of UNIDO.
10. Agribusiness and rural entrepreneurship development is a major focal are of development programmes of UNIDO and constitutes the main approach of poverty reduction for the Millenium Development Goal (MDG).
11. Since 1986, UNIDO in cooperation with United Nations Development Programme (UNDP) has established the *Regional Network on Pesticides for Asia and the Pacific (RENAP)* covering 17 countries of the Asia-Pacific region. Since then RENPAP has promoted the production of safe and environmentally sound pesticides formulation in developing countries. Yearly supported workshops (technical and scientific) are carried out by RENPAP in the domain of formulation of alternatives to POPs pesticides including bio-and botanical pesticides. UNIDO is currently maintaining the RENPAP network on a trust fund contribution from participating countries. UNIDO/RENPAP has been pursuing the development of the Neem Kernel Aqueous Extract (NKAE) as pest control agent since 1997 under the project "*Technical Support for development and production of neem products as environment friendly pesticides*" funded by UNDP and the GoI and its 2nd phase "*Production and Promotion of Neem based pesticides as environment friendly biodegradable alternatives to chemical pesticides*" has been entirely financed by the GoI. Additionally, RENPAP has been promoting Bt-based pesticides in PR China, India, Myanmar and Thailand since the early 1990s.
12. UNIDO has successfully implemented a project on “Reduction of chemical pesticides production and promotion of non-DDT formulations based on bio-pesticide and water-based formulations using capsule suspension technology - US/CPR/08/004 & SF/CPR/08/005 in P.R. China in collaboration with China International Centre for Economic and Technical Exchanges (CICETE)/Ministry of Commerce (MOFCOM), China and the Nantong Pesticide Formulation Centre, Nantong, Jiangsu Province, which is the Technical Coordinator Unit of RENPAP on the subject. In collaboration with Huazhong Agricultural University, Wuhan, the project developed laboratory and pilot scale operations of selected high technology capsule suspension pesticide formulations of Bt based biopesticides and others to replace persistent organic pollutants (POPs) pesticides such as DDT and other hazardous pesticides for use in agriculture and public health. The results have been disseminated to the developing countries through RENPAP. The project strengthened R&D capability and cooperation among enterprises, research institutions and academia and supported national priorities in the country’s 11th five year plan to reduce 10% reduction in emission of harmful chemicals by 2010 in P.R. China.
13. The UNIDO Centre for South-South Industrial Cooperation (UCSSIC) in India is involved in implementing a number of projects in African countries. Recently, the GoI approved the UCSSIC project on “*Promotion of neem derived bio-pesticides in West Africa*”, aiming to transfer technology and develop skills in production and promotion of neem based botanical pesticides in Ghana, Nigeria and Sierra Leon as alternatives to POPs pesticides. The project will be supported by the technical expertise from RENPAP.

14. “UNEP’s comparative advantage for the GEF is related to its being the only United Nations organization with a mandate derived from the General Assembly to co-ordinate the work of the United Nations in the area of environment and whose core business is the environment. UNEP’s comparative strength is in providing the GEF with a range of relevant experiences, proof of concept, testing of ideas, and the best available science and knowledge upon which it can base its investments. It also serves as the Secretariat to three of the MEAs, for which GEF is the/a financial mechanism. UNEP’s comparative advantage also includes its ability to serve as a broker in multi-stakeholder consultations.” UNEP is mentioned in the comparative advantage matrix of the GEF agencies as Technical Assistance and Capacity Building providing agency for initiatives under the POPs Focal Area.
15. UNEP is the voice for the environment in the United Nations system. UNEP is the primary driving force in the UN system for international activities related to the sound management of chemicals. The aim is to promote chemical safety and provide countries with access to information on toxic chemicals. UNEP promotes chemical safety by providing policy advice, technical guidance and capacity building to developing countries and those with economies in transition, including activities on chemicals related to the implementation of the Strategic Approach to International Chemicals Management (SAICM).
16. The “Harmful Substances and Hazardous Wastes” sub-programme of the Division of Technology, Industry and Economics (DTIE/Chemicals Branch) assists countries and regions in managing, within a life-cycle approach, chemical substances and waste that have potential to cause adverse impact on environment and human health. Since 2012, UNEP Chemicals Branch has the leadership of the Global Alliance for the Development and Deployment of Alternatives to DDT as confirmed through decision SC-6/1. The Global Alliance for the Development and Deployment of Alternatives to DDT was established by the fourth meeting of the Conference of the Parties through decision SC-4/2 and the Secretariat of the Stockholm Convention had the lead. This has changed when the Global Alliance was transferred from the Convention Secretariat to UNEP through decision SC-5/6 at COP-5.
17. In addition, UNEP implements a number of DDT-related projects financed by the GEF in the African, Latin America and Asian regions under the Global Programme on Demonstrating and Scaling up of Sustainable Alternatives to DDT in Vector Management (Global DSSA Programme) and thus, has a wealth of experiences with implementation of projects addressing alternatives to DDT in vector control, including but not restricted to malaria. These projects typically are implemented jointly with WHO. As such UNEP is well placed to partner with other organizations to phase out current and avoid future practices of DDT use in the proposed project in India.

A.4. The baseline project and the problem that it seeks to address:

BASELINE SITUATION

Overview:

18. A large section of India’s population suffers from a significant disease burden from vector borne diseases in the form of morbidity and mortality from malaria, kala-azar (visceral leishmaniasis), filariasis, Japanese encephalitis, dengue and chikungunya. To address the above, the National Health Policy (2002) set a goal of reducing malaria, dengue and Japanese encephalitis mortality by 50 % by 2010 and eliminating kala-azar and lymphatic filariasis by 2015.
19. As early as 1950s, India has been addressing the control of vector borne diseases when the first plant of DDT manufacture has been set up by the Hindustan Insecticide Limited (HIL), a GoI enterprise. The capacity of DDT manufacture had increased by setting up 3 production units in Delhi; Udyogamandal, Kerala; and Rasayani, Maharashtra with an annual installed capacity of 18,500 MT of active ingredients and 35,000 MT of formulated DDT. Additionally, import from Russia was made to meet the total DDT demand in the country.
20. Malaria is a public health problem in several parts of India. About 95% of the population resides in malaria endemic areas and 80% of malaria reported in the country is confined to areas consisting of 20% of population residing in tribal, hilly, difficult and inaccessible areas. Malaria is now particularly entrenched in low-income rural areas of eastern and north-eastern states, but important foci are also present in the more arid western parts of the country, for example near agricultural development projects and in many urban areas. The number of cases decreased from 75 million in the early 1950’s to 1.56 million in 2009. The number of death due to malaria reported in 2009 was 1,144. In India kala-azar (KA) is endemic in eastern States of India viz. Bihar, Jharkhand, Uttar Pradesh and West Bengal. It is estimated that about 165.4 million population at risk in these 4 states covering 48 districts. Mostly poor socio-economic group of population primarily living in rural areas are affected.

21. There are six primary vectors of malaria in India. These are *Anopheles culicifacies*, *A. stephensi*, *A. fluviatilis*, *A. minimus*, *A. dirus* and *A. epiroticus*. In addition to these, *A. annularis*, *A. philippinensis*, *A. varuna* and *A. jeyporiensis* have also been reported as malaria vectors of secondary importance. *A. aconitus* and *A. maculatus*, the two malaria vectors reported from Bangladesh, Bhutan and Nepal are also found in bordering areas of India but there is no report of their vectorial status in the country. Sporozoite positive specimen of *A. subpictus*, which is a vector of malaria in Indonesia and Sri Lanka, has also been reported from India. Of the six (6) primary vectors, *A. culicifacies* is most widely distributed throughout the rural plain areas in India and have been reported to be resistant to most of the insecticides, which have been used for malaria control in the country. *A. culicifacies* is a complex of five sibling species in India but for insecticide resistance most of the reports are with sensu lato populations. *A. stephensi*, another prominent vector in urban areas, has also been reported to be resistant to different groups of insecticides even though these insecticides are not used for indoor spraying against *A. stephensi* because in urban areas the emphasis is given on anti-larval methods. Among other primary vectors, only *A. fluviatilis* has also been reported to be resistant to different groups of insecticides even though these insecticides are not used for indoor spraying against *A. stephensi* because in urban areas the emphasis is given on anti-larval methods. Among other primary vectors, only *A. fluviatilis* has been reported to be resistant to DDT and HCH in certain parts of the country while remaining fully susceptible in some other areas. The other three primary vectors, *A. minimus*, *A. dirus* and *A. sondaicus* have not been reported to be resistant to any of the insecticides used against them. In spite of their susceptibility to insecticides, these species have been reported to transmit malaria in certain parts of the country particularly in the northeastern states and Andaman & Nicobar Islands. *A. minimus* and *A. dirus* prefer to rest outdoors in DDT sprayed areas, due to the excito-repellency effect of DDT. Among the secondary vectors, *A. annularis* and *A. philippinensis* and *A. varuna* are reported to be resistant to DDT and HCH in certain areas but there is no report of insecticide resistance in case of *A. jeyporiensis*.
22. Indoor Residual Spraying (IRS) is a major intervention of Vector Control Programme for malaria and kala-azar control in India. There are currently 7 insecticides recommended by the World Health Organization (WHO) for IRS, including DDT. According to the DDT Register, the Acceptable Purposes is currently being used by 18 countries in Africa, Asia and Pacific, and Middle East for disease vector control.
23. In India, one of the major vector control programme strategies of the Government for elimination of malaria and kala-azar is through IRS with DDT up to 6 feet height from the ground, sprayed twice annually as per WHO guidelines. Three (3) insecticides namely DDT, malathion and synthetic pyrethroids are used for IRS. Specific spraying is done using pyrethrum in urban areas only. By using DDT as IRS, India has reduced the malaria disease incidence by 60% since 1992.
24. The entire programme of NVBDCP using DDT as the main stay had IRS. Table 1 shows the amount of formulated DDT used in India since 2006. The annual supply of DDT 50% WP to NVBDCP for internal usage ranges from 12,845 MT in 1990 to 8,560 MT in 2006 (Table 2), which shows a significantly decreasing trend as seen from the volume used in the last couple of years.

Table 1: Amount of formulated DDT used in India

Year	Amount in MT
2006-2007	6,826
2007-2008	6,000
2008-2009	6,821
2009-2010	6,694
2010-2011	5,875
2011-2012	6,427
2012-2013	6,182

Table 2: Annual supply of DDT 50% WP to NVBDCP for internal usage in MT

Year	Amount in MT
1990-1991	12,844.95
1991-1992	11,733.50
1992-1993	11,525.00
1993-1994	12,752.40
1994-1995	8,533.80

1995-1996	10,850.00
1996-1997	8,206.20
1997-1998	8,542.00
1998-1999	6,800.00
1999-2000	7,500.00
2000-2001	7,000.00
2001-2002	6,150.00
2002-2003	6,042.00
2003-2004	8,208.00
2004-2005	8,500.00
2005-2006	8,560.00
2006-2007	6,825.00
2007-2008	6,000.00
2008-2009	6,821.00

25. Two facilities of HIL produces approximately 6000 MT of 50% WP DDT on demand where DDT is dispatched to requesting states for application. India has been exporting 75% WP DDT since 2006 (as per Table 3 below) to malaria endemic African countries such as Eritrea, Gambia and Mozambique that uses this on their malaria control programme. Detailed distribution of exported 75% WP DDT to the three (3) countries mentioned above from 2006-2009 are given in Table 4 below.

Table 3: India export of DDT to Africa

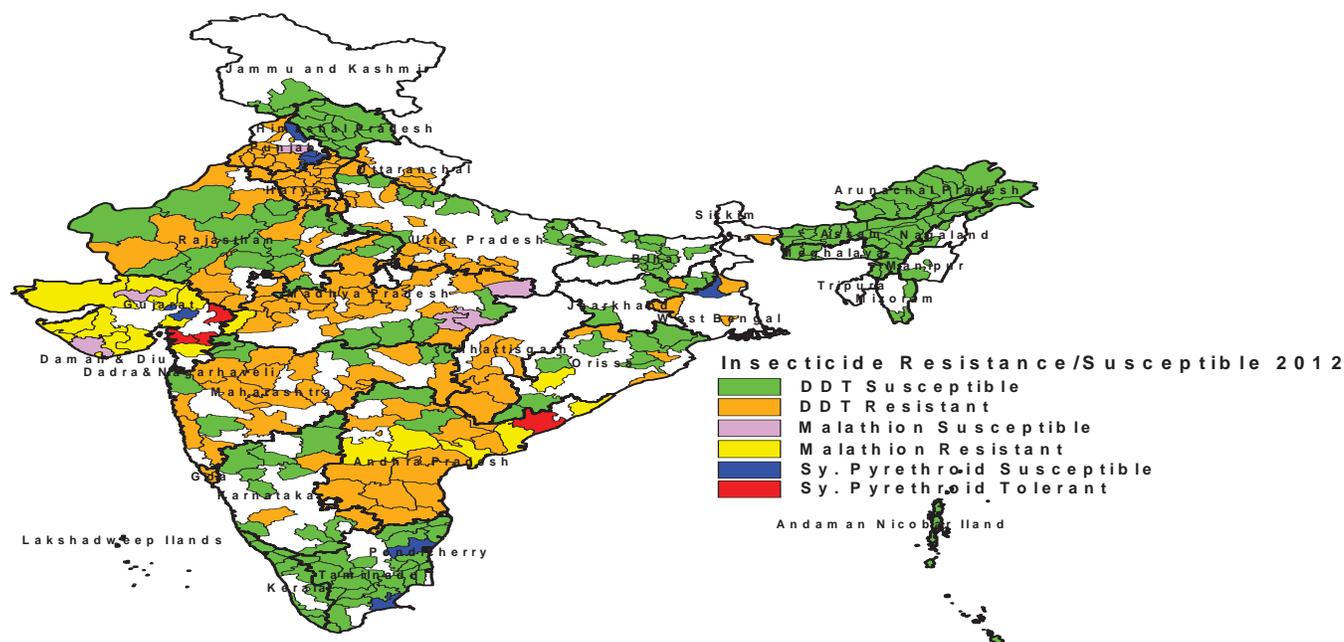
Year	Amount in MT
2006-2007	431.64
2007-2008	620.69
2008-2009	165.18
2009-2010	41.0
2010-2011	420.0
2011-2012	400.0
2012-2013	290.0

Table 4: 75% WP DDT exported to African countries (2006-2009)

Year	Country	Amount in kg
2006/07	Eritrea	1,500
	Mozambique	430,140
2007/08	Gambia	8,000
	Mozambique	612,690
2008/09	Mozambique	165,180

26. With the continued use of DDT in the country and elsewhere in the world viz. countries in Africa, some Anopheles mosquito species have developed resistance to DDT. The insecticide resistance of primary mosquito vector is shown in Figure 1 below. Monitoring of insecticide resistance to disease vectors is a regular phenomenon under NVBDCP. The malaria vector *An. culicifacies* has developed resistance to DDT in some specific malaria areas. *An. minimus*, *An. dirus*, *An. fluviatilis* are sensitive to DDT. At present there is no resistance to Malaria vectors with synthetic pyrethroids in the country. There are only stray reports on degree of tolerance towards pyrethroids. No other pesticide excepting pyrethroids have been successfully applied and tested.

Figure 1: Insecticide Resistance / Susceptible 2012 in India



BASELINE PROJECT

27. The baseline project "Environmentally sound alternatives to DDT" has been described as the National Implementation Plan (NIP) action plan for elimination of DDT. The main component of the DDT action plan is to produce and promote cost-effective and sustainable alternatives to DDT. The baseline project has a projected budget of US\$ 35.5 million to implement the action plan.
28. The baseline project consists of five (5) major outputs as follows:
- (i) *DDT situation analysed in different malaria and kala-zar endemic areas/states of India*
29. The use of insecticide for reducing population of malaria disease vector continues to be the mainstay of the malaria control in India. However due to various technical, operational and economical considerations, the dependence on their use is gradually diminishing. The use of DDT under public health is mandated at the highest Government level on the basis of epidemiological impact of its use and sustainability of malaria vectors. The domestic consumption of DDT for vector control in the last decade is shown in Table 3.

Table 5: Use of DDT for vector control in India

DDT	2002-03 (MT)	2003-04 (MT)	2004-05 (MT)	2005-06 (MT)	2006-07 (MT)	2007-08 (MT)	2008-09 (MT)	2009-10 (MT)	2010-11 (MT)	2011-12 (MT)	2012-13 (MT)
Malaria	5,800	6,000	6,000	6,000	6,450	4,800	5,991	5,694	4,359	4,095	3,905
Kala-azar (Visceral leishmaniasis)	1,180	2,500	2,650	2,560	375	1,200	830	1,000	1,516	2,332	2,227
Total	6,980	8,500	8,650	8,560	6,825	6,000	6,821	6,694	5,875	6,427	6,182

30. In 2008-09, DDT was supplied to 22 states in India for malaria control of which the highest amount of 50% WP DDT was supplied to Assam to the tune of 1,185 MT followed by Chhattisgarh, Jharkhand, Bihar of 440 MT each,

West Bengal and Jharkhand 150MT each and Uttar Pradesh 90 MT. Region-wise there is no significant variation in DDT consumption for the last 5 years.

- North East- Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland, Tripura and Sikkim
- North – Jammu and Kashmir, Uttar Pradesh, Uttaranchal, Chandigarh, Punjab and Rajasthan
- East- West Bengal, Bihar, Jharkhand and Orissa
- Central- Madhya Pradesh and Chhattisgarh
- South- Karnataka and Andhra Pradesh

(ii) Viable alternatives, both chemical and non-chemical, for DDT to be evaluated

31. The Directorate of NVBDCP, central agency responsible for guidelines, policy and implementation of vector borne diseases in India has been implementing the Integrated Vector Pest Management (IVPM) strategy for effective management of vector population. IVPMP is a tool for managing vector population to reduce or interrupt transmission of disease. IVPMP is seen as a way forward to improve cost-effectiveness, ecological soundness and sustainability of disease vector control. It emphasizes that the pesticides used in the programme must have negligible adverse human health effects, must be effective against the target species, must have minimal effect on non-target species and natural environment and their use must take into account the need to prevent the development of resistance.
32. The IVPMP Programme in India encourages the following:
 - (a) ***Use of Long Lasting Insecticidal Nets (LLIN) for prevention of malaria***
 33. LLIN is a factory-treated mosquito net made with netting material that has insecticide incorporated within or coated around the fibres. The net must retain its effective biological activity without re-treatment for at least 20 standard washes under laboratory conditions as defined in WHO guidelines. The number of washes providing mortality and/or knock-down (KD) above the cut-off point (more than 80% mortality after 24 hours and/or above 95% KD after 60 minutes post-exposure) after 3 minutes exposure. Based on WHO specified standard specification, national standard for LLIN is already established in India.
 34. In India the efficacy trials of insecticide treated nets carried out in Orissa and Assam have shown promising results for its large-scale introduction in the operational malaria control programme. The deltamethrin treated nets were found effective against malaria transmitted by *A. minimus* (Jana Kara et al., 1995). Other trials on nets treated with deltamethrin suspension concentrate (SC) and tablet formulation or lambda-cyhalothrin against *A. culicifacies* were successful in reducing high vector density (Sampath et al., 1998, Yadav et al., 2001, Sharma et al., 2005, 2006).
 35. A number of insecticide formulations are available for treatment of mosquito nets. WHOPEP recognises only pyrethroid based LLIN while investigations with non-synthetic pyrethroid based LLIN is at an experimental stage. However, these formulations are required to be accurately weighed or measured in order to obtain the right concentration over the nets. These measurements at time, pose problems and accuracy is difficult to be sustained under field conditions and particularly for large-scale community level treatment programme. Although it is relatively feasible to distribute mosquito nets through social marketing in malaria endemic countries, however, regular insecticide re-treatment has been found to be very difficult to implement resulting in a very low re-treatment rates. To overcome these problems, LLINs treated at the manufacturing level with insecticide either incorporated into or coated around fibres and are resistant to multiple washes have been developed during recent years (Guillet et al. 2001, Sharma S.K. et.al 2011). The biological activity lasts as long as the net itself (3 to 4 years for polyester nets, 4-5 years for polyethylene nets). According to WHOPEP, LLIN should maintain a bioefficacy for $\geq 95\%$ knockdown and/or $\geq 80\%$ mortality against target mosquito vector species for at least 20 serial washings in laboratory and 3 years of continuous use in the field conditions (WHO, 2005). Fulfilling these criteria, 4 LLINs have been given full WHOPEP recommendations and 9 brands of LLINs received interim recommendations from WHOPEP for its use in malaria prevention and control (WHO 2012 guides).
 36. New brands of LLINs require field evaluation before they are recommended for use in malaria vector control, in collaboration with WHOPEP and the LLIN-industry. In India, studies on the bio-efficacy of PermaNet 2.0 (Deltamethrin), Olyset net (Permethrin), Interceptor (Alphacypermethrin) and Icon Life (Deltamethrin) LLINs against local malaria vectors in different parts of the country have shown good results. In an earlier study, Olyset

net, a permethrin treated LLIN, and Interceptor net treated with alpha-cypermethrin were found wash-resistant and maintained its bioefficacy against local malaria vectors in Orissa even after 20 washes (Sharma et al, 2006, 2009a, 2009b, 2010). Based on these trials, PermaNet 2.0 and Olyset nets have been introduced in the operational programme managed by NVBDCP. These LLINs are described in Annex G.

37. NVBDCP introduced LLINs in 2009 with the limited supply of 2.23 million due to limited availability by manufactures and their capacities. Registration in the country with the Central Insecticide Board (CIB) was the main constraint for supply as per technical requirement of LLINs in the country. The Government had procured from international market a total of 4.805 million LLINs from 2009 -2011 and supplied to the high risk population in malaria endemic districts.
38. The task of achieving high LLIN coverage of population living in malaria endemic areas in India faces challenges such as determination of at risk and target populations, lack of resources required to scale up coverage in target populations, development of operational guidelines for net distribution, choosing the appropriate net delivery mechanism and evaluation of the programme using standard survey methodologies. It is also important to evaluate long term field performance of LLINs especially assessment of community acceptance and coverage rate, epidemiological impact and attrition rate. The scaling up of LLINs is one of the most important strategies of NVBDCP towards control of malaria. To realize the full potential of LLINs, the production needs scaling up to achieve full coverage of the entire population of the villages.
39. In order to have a significant reduction in morbidity and mortality due to malaria, there is a need to have achieve universal coverage and maximum utilization of LLIN by all population living in high endemic areas (API>2) [Annual Parasite Incidence = API = (confirmed cases during 1 year/population under surveillance) x 1000]. Epidemiological data of 2011 revealed that 150 million population in different endemic districts are having more than 2 API. The technical requirement of LLIN for the coming years has been calculated at 2.5 LLINs for 5 persons. The result is shown in Table 4 below:

Table 6: Projected technical requirements of LLIN in India

	2013	2014	2015	2016	2017
Effective LLIN available at the beginning of the year (a)	11.4 million	19.8 million	31.9 million	39.4 million	28.8 million
Technical requirement (b)	60 million	60 million	60 million	40 million	30 million
Required for universal coverage(b-a)	48.6 million	40.2 million	28.1 million	0.6 million	1.2million
Supplied during the year	10.6 million	14.8 million	13.4 million	-	-
Requirement not met	38 million	25.4 million	14.7 million	-	-

40. There will be increase in population year wise at a growth rate of 1.6% annually as per decade growth. The small quantity of LLIN will be increased accordingly. But on the other side, there will be decrease in API also due to impact of LLIN. Thus the increased quantity in different years for population is not required.
41. The intensive scale up of LLIN coverage and focused IRS will have rapid and significant impact on malaria illness, deaths, and health care cost. The latest projections for LLIN as per technical requirement and population exposure in the malaria endemic areas is given in Table 5 below.
- 1) Population more than 2 API eligible for vector control: 150 million

- 2) Population in remote & operationally difficult areas eligible for LLINs: 75 million
- 3) Total requirement for LLINs for universal coverage: 60 million
- 4) Community ownership at present: 5-6 million
- 5) NVBDCP supplied nets: 11.38 million up to 2011-12
- 6) Maximum capacity of programme procurement and purchase annually: 5 million
- 7) LLIN have life 3-4 years , so replacement each year at sustained level: 5 million

Table 7: LLIN coverage in the country depicting proposed quantity of LLIN for 2012/13 and 2013/14

State	2009-10	2010-11	2011-12	2012-13 Indented during 2011-12	2013-14 Indented during 2012-13
Assam	400,000	1,010,000	424,122	541,200	1,609,000
Arunachal Pradesh	0	20,000	100,000	100,000	400,000
Manipur	0	55,000	0	75,000	50,000
Meghalaya	150,000	155,000	108,631	150,000	760,000
Mizoram	70,000	80,000	100,000	100,000	250,000
Nagaland	0	50,000	50,000	175,000	200,000
Tripura	166,000	300,000	136,933	230,000	531,000
West Bengal	150,000	200,000	481,200	300,000	800,000
Andhra Pradesh	0	0	1,005,866	889,000	0
Chattisgarh	100,000	0	903,040	634,000	1,300,000
Jharkhand	0	0	660,000	2,052,625	2,000,000
MP	0	0	707,540	1,458,000	1,100,000
Orissa	1,199,000	700,000	1,902,668	3,139,000	2,000,000
Karnataka	0	0	0	250,000	800,000
Maharashtra	0	0	0	240,000	900,000
Gujarat	0	0	0	300,000	800,000
	2,235,000	2,570,000	6,580,000	10,633,825	14,800,000

42. Given the difficulties of maintaining high coverage and quality of DDT spray, it is expected that over a few years LLIN will replace DDT spray in most areas. Priority for provision of LLIN would be given to those high risk populations, which cannot be reached by DDT spray because of operational factors such as poor access as well as those living in forest and forest fringe areas. Many of these areas remain cut-off during rainy season and the use of LLINs are appropriate as they can be delivered several months before transmission picks up.

Table 8: DDT Replacement by LLIN

Total DDT procured	Population covered	LLIN-Technical requirement
6,000MT	40 million	16 million (this indicates the technical requirements of LLIN vis a vis use of DDT as IRS (6000 MT))

43. As LLINs are treated with insecticide and maintain at their end of life a significant amount of their initial charge, the issue of proper waste management of LLINs is significant. Current disposal practices in the country are not well characterized, but (as an indication) practices in sub-Saharan African countries are typically adhoc at the local, district or national level, with the result that the great majority of used LLINs are reused for (unapproved) alternative uses or simply being disposed of in the environment in an uncontrolled manner.
44. UNEP has collaborated with the WHO's Global Malaria Program in the development of the WHO "Draft Interim Recommendations on the Sound Management of Packaging for Long Lasting Insecticidal Nets (LLINs)". This publication provides guidance on how to handle insecticide containing LLIN packaging waste. The publication's recommended actions have many parallels to actions applicable to managing LLINs at end of life.

45. UNEP is in contact with WHO concerning the development of guidance for waste handling options for LLINs, which have many issues similar to LLINs packaging and which should benefit from the LLINs packaging Interim Guidance. UNEP is active in investigating such waste LLIN collection schemes as reverse logistics (e.g. in conjunction with LLIN mass distribution campaigns or through community health centers) and is also active in providing guidance on appropriate technical options for recycling and disposal of used LLINs.
46. Technical options for proper disposal (e.g. through high temperature incineration or in cement kilns) or recycling have been investigated and described through the work above, though to date there have not been any significant piloting activities to characterize putting into operation the proposed solutions. The proposed project would therefore pilot appropriate activities.
47. A related issue in any collection scheme will be social background studies. These studies are essential to characterize and inform users' attitudes towards LLINs and to identify any precautions needed to ensure that LLINs continue to be perceived as a sound, safe option and will be used for protection from vector-borne diseases.

b. Application of biological control agents such as bio-pesticides:

Bacteria based bio-pesticides

48. Certain strains of *Bacillus thuringiensis* var *israelensis* (Bti) produce mosquitocidal toxins during spore formation, which are highly effective against mosquito larvae. These bacterial toxins are produced by fermentation and formulated as biolarvicides (biopesticides). A number of formulations of these effective strains are now commercially available for large-scale use (de Barjac 1990). Endotoxins by *Bacillus* species are often species specific, environmentally safe and are most unlikely to induce resistance as observed in chemical insecticides, as the toxins have lesser residual efficacy and are generally safe for non-target organisms (WHO, 1982; Lacey et al., Siegel 2001). Different strains and formulation of these biolarvicides have been evaluated in India against a number of immatures of different mosquito species under laboratory and field conditions (Monomania et al., 1987; Mittal et al., 1993., Dua et al., 1993; Kumar et al., 1995; Kar et al., 1997; Sukla et al., 1997). Cost-wise, the control of vector with these biolarvicides have been found to be comparable (Balaraman and Hoti, 1987). At present, it is regarded as most promising microbial agent against mosquitoes and black flies, which is used as a component of IVPM under NVBDCP (Sharma S.K. et al 2008).
49. Recently, an Indian strain of *Bacillus thuringiensis* (Bti AS, VCRC B17) has been manufactured by Tuticorin Alkali Chemicals and Fertilisers and is being marketed by Godrej Hi-Care under the branch name of TACBIO. The biolarvicide is in the aqueous suspension formulation. In order to get the recommendation of the Technical Advisory Committee of the MoHF&W, an evaluation of the product has to be taken up. In view of this, the above mentioned companies sponsored the field trial, which was carried out in urban area of Rourkela, Orissa to demonstrate the operational feasibility and its impact on mosquito densities.
50. Bio-efficacy of various formulations of Bti was tested in the field at various sites by the National Institute of Malaria Research (NIMR) and its field unit. All trials were conducted by following the Common Protocol for Insecticide and Larvicides. NIMR has tested the following biopesticides as biolarvicides in Table 7 below:

Table 9: Tested biopesticides as biolarvicides in India

1.	Bacticide WP (Bti-H14 strain 164
2.	BMP 144-2X AS
3.	Moskiture WP
4.	Deltafix G
5.	Vectobac12 AS
6.	Vecto bac WDG
7.	Vector bac Tablet
8.	Wockhardt WP Bto
9.	TACBIO AS Bti
10.	Teknar HPD
11.	Bioflash G
12.	Bacticide DT

Note: Out of 12 tested biolarvicides in the country by NIMR, only 2 biolarvicides viz. Bacticide WP (Bt-H14 strain 164) and Vectobac 12 AS are used as larvicide under NVBDCP.

Neem based biopesticides

51. The country project “*Technical Support for Development & Production of Neem products as Environment Friendly Pesticides - Phase I*” was initially funded by UNDP/GoI and executed by UNIDO/RENAP. After its successful execution and evaluation by the GoI, sole funding of Phase II “*Production and Promotion of Neem based pesticides as Environment Friendly Biodegradable Alternatives to Chemical Pesticides*” came from India to extend studies on Neem as alternative to chemical pesticides covering the entire country. During the implementation of Phase II, the bio-efficacy of neem-based pesticide has been tested on various group of crops including vegetables, fruits, cereals, cash crops and plantation crops such as tea, coffee and spices. In addition, a large number of trials on the use of neem-based pesticides have been conducted against malaria vectors. Various reports have been prepared on the outcome of the project implementation, accepted by the Department of Chemicals and Petrochemicals, GoI and are available.
52. Through the successfully implemented country projects mentioned above, a low cost single step Neem Kernel Aqueous Extract (NKAE) technology has been developed and successfully transferred to the farming community in the country. The NKAE technology has empowered the farmers to produce their own neem-based pesticides to meet the pesticide requirements at village level. Neem has been proven effective against variety of pests that were previously (prior banning of DDT in agriculture) controlled by application of DDT. Scientific methods have been established for quality neem seed collection, depulping, drying and processing. As a result of this, there has been increased use of neem based pesticides (NKAE) by the farming community and proportional reduction in the use of toxic pesticides. Neem processing centres (Neem sheds) have been established at various institutions and locations namely Neem Foundation (Nagpur), Vivekananda Institute of Biotechnology (West Bengal), IPFT (Gurgaon), Tocklai Research Station (Assam), UPASI Tea Research Foundation (Coimbatore), Punjab State Council for Science and Technology (Chandigarh), Indian Cardamom Research Institute, Spice Board (Kerala), Central Coffee Research Institute, Coffee Board (Karnataka) and Bidhan Chandra Krishi Viswavidyalaya (West Bengal). These centres are now fully operational to serve as Centres of Learning for the farming community and provide technical support and material for promoting safer and environment friendly neem based products at grass-root level involving resource poor farmers for sustainable eco-friendly agriculture.
53. NKAE have been extensively evaluated in the field against number of economic pests on different crops including tea, coffee, spices and vegetables in different parts of the country viz. Punjab, Karnataka, Kerala, Andhra Pradesh, Tamil Nadu, North-Eastern region. The bioefficacy of the NKAE has been established through undertaking scientific field trials at different agro-climatic zones. Industrial scale up has been successfully completed and tested at multi-locations. Large number of scientific trials have been conducted and supervised under the successfully completed Phases I and II projects executed by RENPAP/UNIDO. Over 1100 demonstrations have been conducted through the above projects and have resulted in confidence building in the farming community. Large number of farmers is opting now for NKAE neem based pesticides. Return-cost ratio, social acceptance, farmer’s perception and assessment of the impact of neem based pesticides on environment was carried out involving different crops in the field and through household survey. Socioeconomic studies of the NKAE based biopesticides have indicated a high return-cost ratio of 2.01 (in case of neem-based NKAE) and 1.77 (in the case of chemical pesticides). The scale-up of the technology to the industrial scale possibility for production have been undertaken during the Phase II at different locations mentioned above. In the proposed project, the data generated would be utilised to test the NKAE against the mosquitoes in different region of the malaria endemic areas.
54. Physicochemical specifications are available for neem based formulations. Neem oil and neem kernel powder as component; coil, spreading formulation suspension concentrate formulations are projected to be used. The efficacy of these formulations are comparable to synthetic chemical pesticide based formulations as neem based formulations are safer than chemical pesticide formulations. Since the efficacy of the neem based formulations have been enhanced using plant based synergists and found comparable to the chemical pesticide, chances of its failure in the field is negligible. Besides reports of UNIDO project, number of reports is available in literature to prove the bio-efficacy of neem against variety of pest including mosquitoes. Neem based pesticides have been tested against mosquitoes by different institutions. Neem oil emulsions when applied at rates of 250 ml Neem oil/100m² of water surface to mosquito breeding sites reduced populations of malaria vector, i.e. Anopheles spp by 100% in the first 1-2 weeks after application. However, these emulsions were not as efficacious towards population of the lymphatic filariasis vector, Culex quinquefasciatus, although substantial reduction in larval number occurred within the first week of application (Batra et.al.1998, Dua et al 2009, Nagpal et al. 1995, Awad &Shimaila 2003). Other important references include 5% neem oil in vanishing cream base (Dua et al. 1995);

27.8% Neem oil (hexane-extracted) in coconut oil (Hadis et al. 2003; 2% Neem oil in coconut oil (Kant & Bhatt 1994); 50% Neem oil (Mandal 2011); 4% neem oil in coconut oil (Mishra et al. 1995); 2% Neem oil in alcohol (Riddane Bur Repellant) (Moore et al. 2002); 2% Neem oil in coconut oil (Ravindran et al 2002); 2% neem oil in coconut oil (Sharma et al 1995); 5% Neem oil in vanishing cream base (Singh et al 1996). Various types of neem based coils have been found effective against various species of mosquitoes as repellent (Ansari & Razdan 1996), Sharma & Ansari 1994, Sharma et al. 1993, Tawatsin et al 2009, Palsson & Jaenson 1999, Seyoum, Palsoon et al 2002, Tawatsin et al. 2009). Neem based biopesticides such as mosquito coil, neem cream, neem oil and neem spray as repellent are being produced at small scale level for localised areas. The current market size of mosquito repellents is USD 183 million, of this 50% (USD 92 million) is of mosquito coils only. Large scale production is planned in the proposed project to cover the entire country. The toxicological data given in Table 8 has been generated to confirm that neem kernel powder is non-toxic to mammals.

Table 10: Toxicological data viz acute oral toxicity in mice/rats

Description	Toxicity	Category/Amount in mg/kg
Acute oral toxicity in mice (male/female)	no toxicity	Cat 5: 2,000 mg/kg <LD50 < 5,000 mg/kg
Acute oral toxicity in rats (male/female)	no toxicity	Cat 5: 2,000 mg/kg <LD50 < 5,000 mg/kg
Acute dermal toxicity in rats (male/female)	no sign of toxicity or death of animal	Dermal LD50 may be more than 2,000 mg/kg
Primary skin irritation test in rabbit (male/female)	Neem kernel powder found to be non-irritant	
Irritation to mucous membrane in female rabbit	Neem kernel powder found to be non-irritant to mucous membrane	

(c) Application of larvicides in urban, peri-urban and project areas

55. During 2007-08, multicentric trials were carried out by NIMR in Raipur, Sonapat and Hardwar/Mathura to:
- Evaluate the effectiveness of Bacticide WP and dispersible tablets (DT) (Bti formulations) for control of Anopheles, Culex and Aedes
 - Assess the persistence of Bacticide WP and DT in different breeding habitats
 - Assess the operational dose and frequency of use Bacticide was used in breeding habitats like cement tanks, coolers, drains, pools, tyres and junk yards. Effect of Bacticide WP @ 200 mg/m² was evaluated on late instars of A. Stephens, A. subictus, Culex quinquefasciatus in Raipur and Sonapat . It was also evaluated against Aedes aegypti in Raipur. In Mathura, it was evaluated against A. culcifacies and Culex quinquefasciatus.
56. Results showed 100% reduction of late in star larvae of target species An. stephensi in coolers and cement tanks within a week. Bacticide WP was effective (>80% reduction) in small habitats with clean water for two weeks. The reduction of Culex quinquefasciatus in surface drains (with organic matter), was more than 80% for 7 days and in small containers such as coolers and tanks, the effect persisted for two weeks (more than 80%). Similar results were observed in other breeding sites of anophelines by using Bacticide DT (400mg).
57. The studies revealed that:
- Fortnightly application of Bacticide WP @ 200 MG / M² of water surface area produced more than 80% control of late instars in fresh and polluted water habitats against Anopheles, Culex and Aedes larvae.
 - In different types of breeding habitats the control ranged between 7 and 14 days.
 - Application of one dispersible tablet (400 mg/ m²) of water surface area produced more than 80% control of late instars up to two weeks. In some habitats where water was less than 20 liters, the effect was up to weeks.
 - Bacticide WP and DT formulation were more effective against Aedes compared to Anopheles and Culex species.
 - No adverse effects were noticed against non-target organisms during the period.

Vector behaviour and community acceptance and status of insecticide resistance in vectors:

58. IRS has been carried out with chemical pesticides viz. DDT, Malathion and Synthetic Pyrethroid in identified high endemic villages. Implementation of Village Health Sanitation Committee (VHSC) model under which the basic health facilities including source reduction for mosquito control have been introduced up to the village level.

(iii) Alternative technologies evaluated for the production of compounds such as dicofol where DDT is used as the raw material / intermediate

59. India has registered with the Stockholm Convention Secretariat the specific exemption for DDT as intermediate in the production of dicofol in close system in batches. Production and application is permitted for 150 MT/annum. Specific exemption for use of DDT as intermediate of dicofol production is valid up to 2014. (This is only an information on the latest status of DDT and its usage as intermediate in dicofol production in India as per the decision of the Stockholm Convention on POPs).

60. Dicofol is produced in closed system in batches using DDT, produced in the process, as an intermediate. Through condensation of Chloral and mono-chloro-benzene (MCB), DDT is produced which is further dehydrochlorinated to DDE followed by tetra-chloro through chlorination. Tetra-chloro further hydrolysed in acidic medium to produce dicofol. Non transformed manufacture wastes ethylene dichloride (EDC) is recovered from the final product for re-use through distillation. Whole manufacturing process is done in closed system where after every step transformed materials are transferred through closed lines and reaction process occurs in closed vessel.

(iv) Strengthening of regulatory framework and institutional capacity

61. India has strong legislation and enforcement of DDT issue covered by the Insecticides Act 1968 & Rule 1971 under the Ministry of Agriculture (MoA). The use of DDT in agriculture has been banned in 1989 in the country. DDT is exclusively used only in vector disease control by NVBDCP as per WHO Guidelines and under the strict supervision of the Government.

62. The legislative framework for production, registration, use and disposal of chemicals including biopesticide, botanical pesticide and LLIN in India is scattered between a number of Acts, Rules and Regulations, such as Rules on manufacturing, storage and import of hazardous chemicals; Rules on chemicals accidents, Insecticides act and rules; public liability insurance act, etc. The legal system means that there are many competent authorities with very limited coordination. The enforcement of legislation is patchy, especially with the very many small and medium sized enterprises. There is State level responsibilities, but only with limited capacity and knowledge. India has in 2012 released a draft national chemicals policy where the need for consolidation of Acts and rules has been recognized. The need for a holistic approach towards chemicals legislation together with the consolidation into one coherent and comprehensive piece of legislation is recommended. The legislative provision for the banning of DDT production would be taken up with the start up of the proposed project and pursued strongly to coincide with the commercialization of the new products and technologies procured through the TA grant. This would comprise of new varieties of LLIN impregnated with state of the art synthetic pyrethroids as well as neem based botanical and Bt based bio-pesticides to stand as effective alternative to DDT.

63. Infrastructure facility had been established in India during the implementation of the country project “*Technical Support for Development and Production of Neem Products as Environment Friendly Pesticides*” and its 2nd phase “*Production and Promotion of Neem based pesticides as Environmentally Friendly Biodegradable Alternatives to Chemical pesticides*”. Relevant activities of baseline project such as developing the production and application processes of the proposed alternatives have been successfully completed. Their field tests on malaria vectors have also been carried out and indicated positive results for its large scale effectiveness at national level. Based on these results, HIL is ready and willing to strengthen its existing facilities both in terms of infrastructure and process upgradation for manufacturing of synthetic pyrethroids based LLIN and Bt-based biopesticides. Commercial scale processing of neem based pesticides at different locations where neem seeds are available will also be enhanced under technical cooperation with the Institute of Pesticide Formulation Technology (IPFT).

v) DDT phase out strategy

64. The quantity of DDT for use in public health is decided every year by a Mandate group of experts constituted by the Government under the Chairmanship of the Union Secretary of Health & Family Welfare with members from Planning Commission, Department of Biotechnology, Department of Agriculture & Cooperation, Directorate General of Health Services and Directorate of NVBDCP to decide on the annual usage and procurement of DDT for use against malaria and KA. NVBDCP proposes to reduce the use of DDT and use the insecticide treated bed

nets, bio larvicides, biological control agents like some insect bugs, plant based larvicides and insect growth regulators such as diflubezuron, etc. All the components of IVPM i.e. IRS, chemical larvicides (e.g., Temephos), LLIN, use of bio-larvicides in urban areas, larvivorous fish (e.g., Gambusia affinis) and environmental management by manipulating the sources of breeding mosquitoes have been tested at field level.

65. The planned phase out of DDT production and use is an established priority by the Government. DDT use has been phase out in 4 states namely Haryana, Gujarat, Maharashtra and Tamil Nadu as reported in the Annual Report of the Government (MoCF and the MoHF&W) and the Annual Report of the HIL. The production and promotion of alternatives to DDT has been clearly defined in the NIP action plan on elimination of DDT. With the gradual introduction of these alternatives to DDT in the field, the reliance on DDT would decrease that will ultimately result in the reduction of DDT production. The significant amount of co-financing being indicated shows the strong commitment and support of the Government to continuously finance the programmes for DDT alternatives. Likewise, private entities such as the Tea Board of India, the Indian Coffee Board, the Spices Board of India and other commodity boards have strongly supported the baseline project.

- A. 5. Incremental /Additional cost reasoning: describe the incremental (GEF Trust Fund/NPIF) or additional (LDCF/SCCF) activities requested for GEF/LDCF/SCCF/NPIF financing and the associated global environmental benefits (GEF Trust Fund) or associated adaptation benefits (LDCF/SCCF) to be delivered by the project:

THE GEF PROJECT

66. The GEF project will primarily assist in securing new technologies and strengthening the existing infrastructure base available on the ground and to amend guidelines and - if necessary - legislation to accommodate biopesticides and domestically produced LLINs for vector control. It will also be used for developing capacities to master newly procured technology. The capacities to be developed are of two types: Technical capacities of producing quality bio-pesticide products, screening and development of superior grade plant materials and sound application processes of efficacious new substances to be used and enhanced capacities are also envisaged in human resource development (HRD) wherein training and experience gained throughout the process of execution would lead to substantial improvement in understanding technical information and accumulation of critical knowledge that will contribute to the sustainability of the project outcomes. In order to achieve the overall objective of the project such as to introduce bio- and botanical pesticides and other alternatives to DDT as first step for elimination of dependency on DDT, the demonstration of cost-effective, socially acceptable and environmentally sustainable alternatives to DDT and other POP chemical of similar use is envisaged.
67. The GEF project has five (5) major components, which provides a holistic framework to introduce a holistic 3-pronged strategic approach to enhance manufacturing capabilities and capacities for producing non-POPs alternatives to DDT by promoting safe and environmentally sound products for mosquito vector control at the breeding sites and residential areas. The components include (1) Strengthening of legislation, policy framework and institutional capacity; (2) Production and promotion of alternatives to vector control; (3) Promotion of new dwarf cultivars of neem with early maturity and higher limonoids yield; (4) Development and promotion of IVPM, and (5) Preparation of final technical reports, monitoring of effectiveness of project implementation and evaluation of results. The new strategies and tools would be deployed by the MoHF&W through its NVDBCP, which is mandated to adopt new strategies and tools in the vector control in the country. Based on the results of field trials during the 4th year of the project, it would be possible to conclude the successful implementation of new strategies and tools.
68. Component 1 focuses on the legislation, policy frameworks and institutional capacities throughout the lifecycle of alternatives to DDT such as bio-pesticides, plant extracts and LLIN covering the stages from production, registration, use and disposal as all legal bottlenecks for introduction of the alternatives may lay in each of the stages. The aim will be to look at the overall legislative requirement in order to identify potential gaps and bottlenecks in the legislative and institutional frameworks in order to provide the necessary information and recommendation for ensuring an efficient system for fulfilling the legal requirements at the various stages of the lifecycle of the alternatives and for IVPM development and training (component 4). Guidance documents for producers and users on the legal requirements will be prepared to promote an efficient fulfillment of the various legal requirements throughout the lifecycle of the alternatives to DDT.
69. Presently, despite all efforts under the NVBDCP, about 1.5 million cases of malaria are still reported on an annual basis. Since India is the only country that remained to continue producing and using DDT in a large volume, there

is an urgent need to develop sustainable and cost-effective alternatives to DDT (a phase-out strategy of DDT in the country). Under Component 2, the proposed project will develop efficient pilot production of economically viable alternatives to DDT ready to further enhancement to large scale production for mosquito vector control at breeding sites and in-door such as Bt-based biopesticides (as larvicide), Neem-based botanical pesticides and products (both as larvicide and repellent) and LLIN impregnated with synthetic pyrethroid to restrict mosquito bites significantly, which process malaria and filaria. Strengthening and scaling up the domestic manufacturing capacities available in the country is envisaged through the introduction of new, financially appealing, cost effective technologies and producing products that are socially acceptable by the relevant segments of end-users. The neem formulations will be developed at IPFT (Gurgoan), and the production of neem-based products will be scaled up in the pilot facility at National Botanical Research Institute (NBRI), a premier institute of the Government of India and then the new technologies will be disseminated through private-public partnership (PPP) mechanism. A pilot facility for Bt-based biopesticide production using local strains will be established as well as facilities for the manufacture of synthetic pyrethroids for LLIN formulation incorporating the active ingredient into polyethylene fibres at Rasayani plant of HIL in Maharashtra state. A strategic policy of "cradle to grave" to be adopted for the replacement and proper disposal of "end-of-life" bed nets will be developed to prevent environmental contamination. The proposed pilot site at Rasayani plant of HIL has been selected in consideration of the existing facilities comprising of land, infrastructure and manpower available with HIL, which is presently engaged in the production of DDT. The technologies envisaged in the proposed project are commercially viable elsewhere especially Bt based pesticide and LLIN. The mosquito control programme in India both production (Ministry of Chemical and Fertilizers through HIL) and application of pesticide (MoHF&W through NVBDCP) is being handled by the government. The government through HIL will be the commercial organization involved in the commercial set up of the facility and NVBDCP will be involved in purchasing and application of pesticides in the field. The entire operation of production, distribution and application of pesticides falls within the government set up. The same practice will be followed for the production and use of the alternatives. The Institute for Pesticides Formulation Technology (IPFT) and the National Botanical Research Institute (NBRI) have developed appropriate technologies for production of alternatives to DDT. These technologies are being promoted by the National Research and Development Council (NRDC) nationally. However, large-scale production has not yet been started. The Hindustan Insecticide Limited (HIL), the sole manufacturer of DDT in India would be ready and willing to take these new technologies as viable alternatives to phase-wise replace DDT manufacture. Currently, HIL manufactures DDT less than half of its built-in capacity but further reduction should be economized by the introduction of financially viable alternatives. With the establishment of the commercially domestic alternatives to DDT, countries that rely on exported DDT from India for their vector control programme will be benefitted for the supply of the alternatives as well. The three (3) pronged strategies in eliminating mosquito larvae at the breeding sites, eliminating adult mosquitoes inside the household and ensuring full protection in the endemic areas using LLINs will gear towards a full achievement of project outcomes and sustainability of the proposed alternatives. Business models for the alternatives to DDT will be developed during the implementation stage of the proposed project.

70. It should be noted that the proposed project does not address DDT alternatives to control kala-zar or dengue vectors. DDT alternatives to kala-zar are at operational research stage. For Leishmaniasis vector breeding, hygiene and environmental sanitation is an effective intervention. The disease is in elimination mode by 2015.
71. Component 3 addresses the promotion of new dwarf neem (*Azadirachta indica*) cultivars with early maturity and higher limonoid yield for large scale cultivation. Five (5) cultivars of neem have been identified by NBRI. These cultivars would be propagated using the tissue culture techniques and large scale clonal propagation through macro propagation. The proposed project will support adoption of tissue culture technology and clonal propagation in propagating new cultivars across agro-climatic zones to achieve increased limonoids production at four (4) sites, boosting yield of neem seed/kernels that would help compensate for the replacement of DDT. This activity will be carried out in close cooperation and coordination with a number of selected Farmer's Field Schools where farmers who would plant and take care of growing the neem seedlings would be appropriately trained. The harvesting of the seeds, their collection and further processing will also be supported through the well organized supply chain leading to the 10 private companies formulating the final products. Though the application of DDT is restricted to vector control programme, but the fact is part of it is being used unauthorized in agriculture. DDT may also be used inadvertently as agriculture farms act as breeding grounds for mosquitoes where application of neem based pesticides would be useful to check the menace of the mosquitoes at the earlier stages itself. Hence the application of pesticides is interwoven between vector control and sector of agriculture. Therefore the activities described under component 3 are incremental nature over the baseline project.

72. Component 4 will prepare guidance materials and curricula for IVPM application ready to be implemented in malarial endemic areas. Courses for training the trainers will be organized and then promoted in the study areas. It is expected that the interventions and courses will be tailored to the three agroclimatic zones to provide optimal impact. The training materials and the efficiency of the IVPM will be pilot tested in at least two places of each of the agroclimatic zones. Translation of the guidance materials and forms into local languages is considered essential for successful dissemination. The experiences from the practical applications will feed back into the final guidance documents. This component will identify the most suitable institutions and stakeholders to promote IVPM.
73. Component 5 of the project covers proper technical reporting and monitoring of project interventions and evaluation of the implementation of the project results through a well designed M&E mechanism.
74. The GEF intervention is justified as follows:
- (i) The project objectives, outcomes and outputs meet the goals and objectives of Chemical FA Objective 1: Phase out POPs and reduce POPs releases and are in line with the requirements of the Stockholm and Basel Conventions;
 - (ii) The project will apply ESM and BAT/BEP in manufacturing the non-POPs alternatives to DDT;
 - (iii) Sustainability of the project outputs will be ensured by introducing new, financially appealing, cost effective technologies and creating products that are socially acceptable by the relevant segments of end-users.
75. With the assistance of the GEF, India will make the first step to reduce and ultimately eliminate the dependency on DDT, ensuring food safety following the food safety guidelines of the Government, enhancing longevity and protecting human health and the environment. Large scale plantation of neem trees as foreseen as a project activity will have a beneficial effect on climate change and will bring additional income to a large segment of rural population and farming communities. The project will assist India in meeting its obligations under the Stockholm Convention and thus, will contribute to global efforts to control toxic chemicals in general and to reduce uPOPs releases in particular. It will also indirectly contribute to the objectives of two other international environmental agreements, i.e. the Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal and the Rotterdam Convention on the Prior Informed Consent Procedures for Certain Hazardous Chemicals. The applied methodology that has recently been piloted in India and the field surveys that parallelly carried out with the alternative products have resulted in positive outcome. Based on this, one can realistically assume that the project will provide guidance to developing countries in Asia and Africa in meeting their obligations towards introducing alternatives to DDT under the Stockholm Convention. Strong linkages will be established with the countries participating in the global UNEP/WHO programme of “*Demonstrating and Scaling-up Sustainable Alternatives to DDT in Vector Control Management (DSSA)*”. To facilitate dissemination of technologies and best practices applied, an outreach programme will be developed to obtain the above-mentioned global environmental benefits. To quantify global benefits the project will record the amount of DDT not produced and used, and the amount of uPOPs avoided by reducing the production of DDT.
76. The outcomes of the proposed project would be shared with other countries, which are currently importing DDT from India hence are dependent on DDT. It would be good to have complimentary projects in the affected countries and the lesson learnt through this project could be shared in such projects to promote alternatives to DDT on fast track mode to decrease their reliance on DDT and strategically bring in the safer and biodegradable products in the vector control programme.
77. The UNDAF Assessment 2013-2017 for India identifies six (6) outcomes that include (1) growth, (2) food and nutrition security, (3) gender equality, (4) equality access to quality basic services, (5) governance and (6) sustainable development. The proposed project directly supports outcome 4 of UNDAF. The Approach Paper to the Twelfth Five Plan mentions doubling of public spending in the health sector so as to increase it to 2.0 to 2.5 percent of GDP by the end of the Plan period. The Government agrees that better health is not only about curative care, but also about better prevention. The proposed project identifies and tests alternatives to DDT uses in India and is consistent with the national policy on improving health and focusing on preventive measures. The proposed project also supports outcome 2, which aims at providing not only food to unprivileged population but to ensure that food available is safe.
78. The Government of India will provide co-financing to the project from different Ministries and public sectors in the following ways:

- The Ministry of Environment and Forests (MoEF) will contribute US\$ 6.0 million in-kind for fulfilling legal requirements and pilot trainings on alternatives to DDT as well as project monitoring and management at national level.
 - The Hindustan Insecticide Limited (HIL) under the Ministry of Chemicals and Fertilizers (MoCF) will provide land for setting up the facilities; building/workshops and machineries for the production facilities; laboratory facilities; effluent treatment facilities; utilities (power, water, etc.); manpower for undertaking project activities for the manufacture of LLIN and Bt-based bio-pesticides utilizing the existing DDT production facilities of HIL in Rasayani in the State of Maharashtra as well as storage facilities for the alternatives to DDT and undertake field trials at different locations in malaria endemic areas. For the manufacturing of neem based pesticides namely self surface spreading, suspension concentrated, cream and mosquito coil formulations, the existing facilities of IPFT at Gurgaon, which has been set up under the Government project "*Development of Eco-friendly Neem based pesticides*" with an investment of US\$ 3.0 million will be upgraded. The infrastructure support base to be extended to the project for the various manufacturing could be in the order of US\$ 17.476 million in cash/in-kind. Since HIL receive their funding from the National Budget, co-financing project activities will require redirection of these budget funds, therefore, it is complicated at this stage to separate the cash cofunding without a similar provision in the national approved budget. As solution for this is being sought and by mid-term evaluation of the project, a solution will be found and the contribution can then be reported as cash co-financing to meet the ultimate objective of the project.
 - The National Botanical Research Institute (NBRI) will contribute a total of approximately US\$ 15.5 million (US\$ 3.5 million in cash and US\$ 12.0 million in-kind) for the provision of land for neem plantation and neem sheds, scaling up of neem-based products, propagation of new dwarf neem cultivars using tissue culture techniques and large scale clonal propagation.
 - The Ministry of Health and Family Welfare (MoHF&W) will contribute US\$ 3.33 million in-kind utilizing the existing technical expertise in NVBDCP, NCDC and NIMR for its malaria control programme; and
 - It should be noted that a budget provision of US\$ 35.5 million as co-financing for alternatives to DDT has been approved in the endorsed NIP of India.
79. UNIDO in-kind contribution of US\$ 343,000 will be mainly used for technical expertise for identification and selection of technologies and negotiations of technology transfer of BAT/BEP and production technologies applied in the proposed project, which is in line with its comparative advantage of bringing industry experience and technology to achieve project goals. On-going projects and initiatives in the region on bio- and botanical pesticides will also contribute to the promotion of the alternatives. The cash co-funding of US\$ 67,500 will be used for managerial/monitoring assistance related to Components 2 and 3.
80. UNEP's co-financing of US\$ 424,000 will be in-kind and consist of managerial and technical assistance in issues related to DDT, LLINs and on legislative framework. UNEP has developed the Guidance on the Development of Legal and Institutional Infrastructures for Sound Management of Chemicals and Measures for Recovering Costs of National Administration (LIRA-Guidance) and will bring this wealth of information to the project. UNEP's cofinance will mainly contribute to strengthen and train national and local officials in sound management of chemicals.
81. The GEF grant will be used primarily for the procurement of the latest technologies and/or know-how needed for the production of synthetic pyrethroid group of compounds (for the impregnation of the LLIN that would be long-lasting and at the end of life would result in no significant discharge of the toxic chemical pyrethroid), establishment of Bt biopesticides pilot production facility using local strains as well as scaling up of technology formulations for neem-based botanical pesticides. It will also be used to strengthen the existing infrastructure base available in the ground and developing capacities to master the newly procured technology.
82. The summary incremental cost matrix is given in Table 9 below. Detailed project budget is given in Annexes C (UNIDO), D (UNEP) and E (co-financing).

Table 11: Summary Incremental Cost Matrix in US\$

Outcome	Baseline	Increment	Alternative
Outcome 1: Efficient system for fulfilling legal requirements at the various stages of the lifecycle of alternatives to DDT	1,380,600	500,000	1,880,600
Outcome 2: Development and efficient pilot production of bio-and botanical pesticides as well as other alternatives to DDT ready to further enhancement to large scale production	33,004,000	7,100,000	40,104,000
Outcome 3: Promotion of new dwarf cultivars with early maturity and higher limonoid yield for large scale cultivation	2,316,667	490,485	2,807,152
Outcome 4: IVPM ready to be implemented in malaria endemic areas	2,845,400	795,825	3,641,225
Outcome 5: Monitoring of project interventions and evaluation of implementation	1,984,500	637,500	2,622,000
Project Management Costs	1,616,000	476,190	2,092,190
TOTAL Project Budget	43,147,167	10,000,000	53,147,167

A.6 Risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and measures that address these risks:

83. The alternatives considered but particularly botanical pesticides are environmentally friendly and their large scale manufacture would add towards conservation of the ecosystem including the prevention of land degradation and mitigation of climate change. The robustness of the concept of neem and other biopesticides intervention envisaged in the project ensures effectiveness, even if there are perceptible changes in the vector habitats, both in the existing and in the new areas. The sustained backward linkages of sourcing neem as basic ingredient leans good reason to go ahead with the proposal to deal with any unforeseen impact of climate change on vector control in the future. The proposed project will create and strengthen the existing linkages at the government and community level by providing alternatives to DDT use. One possible risk is that farmers are not so open to adopt alternatives. The pilot exercise will allow to demonstrate how alternatives to DDT can be efficient and cost-effective for many farmers and other groups.

RISKS	LEVEL	RISK MITIGATION MEASURES
1. Due to conflicting interests of the involved ministries, the adoption of policy and legislative framework is delayed	Moderate	Establishment of a coordination committee including the relevant government institutions, private sector, academia and civil society
2. Lack of multi-departmental commitment to support alternatives to DDT	Low	Sensitization of policy makers is timely made and environmentally sound and socio-economically acceptable alternatives will be provided
3. Business model for scaling up production and marketing faces unforeseen obstacles due to inadequate inter-departmental coordination	Low	Inter-departmental coordination is established and close coordination ensured throughout project life
4. For propagating new cultivars at all agro-climatic zones of higher productivity are not prioritized	Low	Propagation of new cultivars is assigned a high priority in the work program of relevant stakeholders. Special attention will be made to exploit domestic cultivars at state level.

5. Regional and interregional outreach program does not receive adequate Government support	Low	Government fully sensitized to provide support for the outreach program. The signed endorsement letter confirms the commitment of the Government. Fund raising activities carried out by all involved agencies will clearly minimize this risk.
6. Monitoring and results indicators are not agreed upon by stakeholders	Low	Both environmental and socio-economic indicators are identified and agreed upon at the early planning (PPG) stage of project and taking into consideration those already adopted in the NVBDCP and other programmes.
7. Climate Change	Low	Risk on climate change is negligible.

A.7. Coordination with other relevant GEF financed initiatives

84. The core commitment of India is expressed not only in the form of ratification of the Stockholm Convention, but also in the active implementation of the World Health Assembly Resolution 50.13, which urges judicious use of pesticides. India actively committed in scaling up non-POPs alternatives to DDT and has secured funding through various sources to support scaling up the coverage of LLINs and other chemical and non-chemical vector control interventions. The proposed project will be strongly linked with the latest strategies related to IVPM in the country. MoHF&W is supporting the objectives of the proposed project, following numerous World Health Assembly resolutions (e.g. WHO 50.13) and urging environmentally sound vector control through the reduction of reliance on, and improve management of (POPs) pesticides. Furthermore, WHO is currently collaborating with project partners to accelerate the development of environmentally friendly (low risk) insecticide alternatives to DDT as a long-term goal to phase out DDT.
85. WHO, UNEP, GEF and the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) are jointly developing a global strategy on achieving the objectives of the Stockholm Convention relating to the provisions on DDT and more precisely the Decision SC-1/25 on DDT of the COP 1. The joint global strategy will address issues relating to complementarity of GEF funding with other funding sources such as that of the GFATM, national funding and other bilaterals and multilaterals. This project will also enhance synergies between the regional WHO/UNEP DDT projects under the Demonstrating and Scaling-up of Sustainable Alternatives to DDT in Vector Management Global Programme (Global DSSA Program) to facilitate sustainable reduction and ultimately elimination of global reliance on DDT.
86. The integration of the project results, with the outcomes and lessons from the other programmes in the various DSSA regions, will be ensured. Other IAs and ExAs will be invited to the project Steering Committee meetings, and included in project related communications as appropriate, to maximize consultation and coordination.
87. During the preparation of the NIP, the coordination and collaboration between and among different implementing agencies in the country and one of the implementing agency (UNIDO) had worked out on a regular basis. Similar coordination has been worked out for the proposed project. MoEF is responsible for looking after the Stockholm Convention and the Project. The National Steering Committee (NSC) already constituted within MoEF represents the nucleus for sustainable and integrated management of the Convention implementation activities. The NSC will be responsible for planning, guidance and monitoring all actions needed for the compliance of the provision of the Stockholm Convention. The NSC of the Stockholm Convention have representatives from all the relevant stakeholder ministries. This helps to ensure that there is no duplication in project activities/implementation and formulation of regulation, thus, enhances the synergy. Linkages with the NGOs and other stakeholders have been established.

B. ADDITIONAL INFORMATION NOT ADDRESSED AT PIF STAGE:

B.1 Describe how the stakeholders will be engaged in project implementation.

88. UNIDO and UNEP will be the GEF implementing agencies for the project. **UNIDO** will be the lead implementing agency that would primarily provide the support base for the production and use of biopesticides and botanical

pesticides and would support the synthesis of pyrethroids and production of LLIN as well as the propagation of new cultivars of neem. UNEP would assist in strengthening the legislation, policy framework and institutional capacity building. UNIDO and UNEP will oversee the overall project implementation through assigned Project Managers. The collaborative implementation mechanism of the 2 UN agencies involved is in line with India's UNDAF.

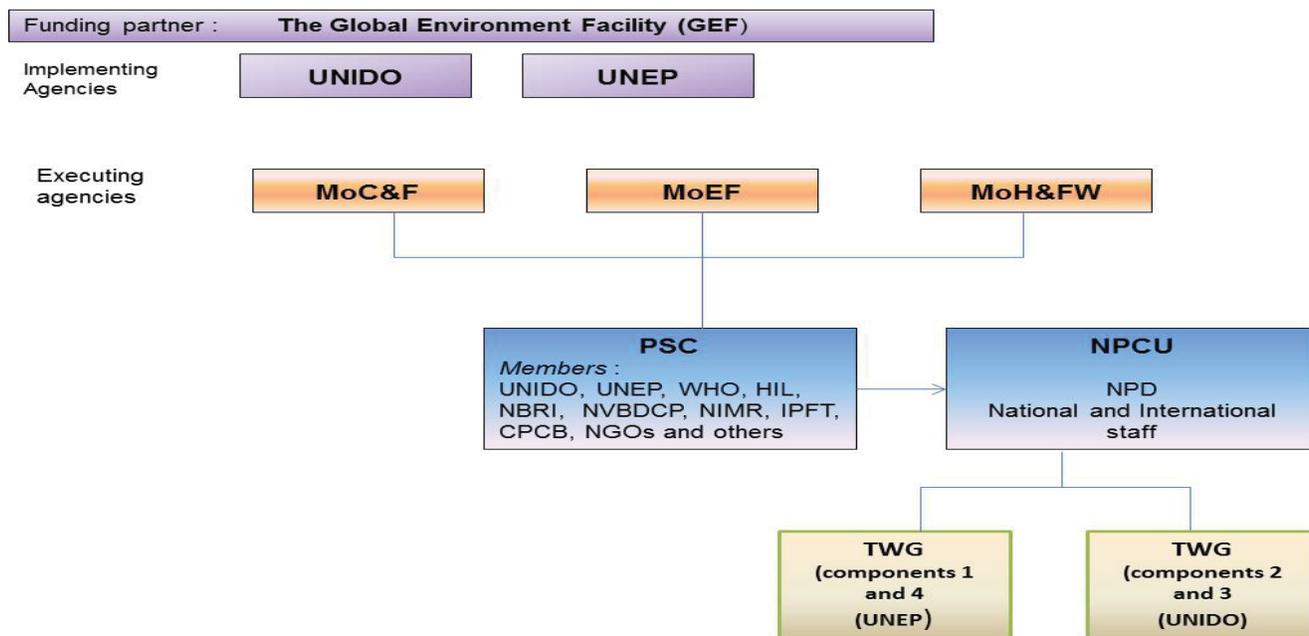
89. Key stakeholders that will be involved in the project are the 3 Ministries namely Ministry of Environment and Forests (MoEF), Ministry of Chemicals and Fertilizers (MoCF) and Ministry of Health and Family Welfare (MoHF&W) whose mandates and roles are given below:
90. The **Ministry of Environment and Forests (MoEF)** is the nodal ministry for planning, promoting and coordinating environmental programmes including the management of chemical disasters in India. The Ministry is mandated to protect the land, air and water systems and is responsible for the prevention and control of pollution including hazardous substances. MoEF is the GEF and Stockholm Convention focal point in the country, which coordinates activities and cooperation between relevant stakeholders of the NIP.
91. The **Ministry of Chemicals and Fertilizers (MoCF)** is mandated to control the production and scaling up of alternatives to non-POPs chemical pesticides. The Department of Chemicals and Petrochemicals of MoCF is entrusted with the responsibility of policy, planning, development and regulations of chemicals and petrochemicals. The public sector namely HIL under the MoCF will be involved in the production, scaling up and setting up of the facility for industrial production of the alternatives, viz. production of synthetic pyrethroids, production of LLIN, neem-based botanical pesticides and Bt-based biopesticides.
92. The **Ministry of Health and Family Welfare (MoHF&W)** mainly performs advisory role for matters related to public health including control vector programme in the country. The Ministry will be responsible for the application, assessment and adoption of alternatives in public health activities; the State Health Departments will coordinate and implement the project activities at the respective state level for the evaluation and assessment of newer alternatives to DDT in the field on the target pest; the *National Vector Borne Disease Control Programme (NVBDCP)*, *National Institute of Malaria Research (NIMR)* and the *National Centre for Disease Control (NCDC)* will undertake activities at the national level and make recommendations on the newer alternatives for adoption at the country level.
93. **Project Steering Committee (PSC)** will consist of representatives from MoEF, MoCF, MoHF&W, HIL, NBRI, WHO, NVBDCP, NIMR, NCDC, Central Pollution Control Board (CPCB), IPFT, UNIDO, UNEP, NGOs, National Project Director (NPD), National Project Coordinator (NPC) and others. The PSC will provide guidance and support to the project as well as to the National Project Coordination Unit (NPCU). PSC will monitor the progress of the project at regular intervals and provide necessary inputs. It will consider networking with other national, state level agencies including national and international NGOs and private sector institutions and foster advocacy work.
94. **National Project Coordination Unit (NPCU)** will manage the project on a day-to-day basis for ensuring the achievement of outputs and objectives stated at national level. NPCU will be headed by the National Project Director (NPD) to be nominated by the Government. The NPD will ensure political and institutional support for the project, responsible for the supervision of the NPCU as well as planning and monitoring of the project implementation progress based on the project's annual work plan and its indicators. The NPD will be supported by the team of experts on fulltime or part-time basis during the entire project including the National Project Coordinator (NPC) to be recruited by the project. The NPC will be responsible for coordinating the day-to-day implementation of project activities at national level and will prepare project progress reports. The NPCU, via the NPD will inform UNIDO/UNEP of any delays or difficulties faced during project implementation so that appropriate corrective measures can be adopted in a timely and remedial fashion.
95. **Technical Working Groups (TWG):** Two (2) TWGs will be established - one for dealing with Components 1 and 4 and the other for Components 2 and 3. Members of the TWG will be comprised of technical experts from the institution of repute in India and participating institutions, UNIDO and UNEP. TWGs would provide guidance on the technical matters related to the development of business plan, technology transfer, scaling up of technology for commercial level, finalisation of the workplan, etc.
96. Five (5) premier governmental institutions in India namely Hindustan Insecticides Limited (HIL), National Botanical Research Institute (NBRI), National Vector Borne Disease Control Programme (NVBDCP), National Institute of Malaria Research (NIMR) and Institute of Pesticide Formulation Technology (IPFT) are involved in the production, distribution and application of insecticide for control of mosquitoes in the country. These institutions will be subcontracted by UNIDO and UNEP based on established Terms of References (ToRs) where

endorsement from the government will be sought to waive the subcontractual process of bidding. Specific activities for each institutions are given as follows:

- (a) **Hindustan Insecticides Limited (HIL)**, a Government Enterprise under the MoCF, was incorporated in 1954 as part of the Government's endeavour to meet the requirement of DDT for National Malaria Eradication Programme (NMEP) and focusing its thrust to eradicate the menace of malaria. HIL is the sole producer and supplier of DDT for malaria and kala-zar vector control in the country. HIL has set up three manufacturing plants in Delhi (shut down in 1997), Udyogmandal in Kerala and Rasayani in Maharashtra State. Currently, only 6000 MT per annum of DDT is being produced for use in public health programme of NVBDCP/MoHF&W. With the government's initiative to gradually reduce and phase out the use of DDT and introduce the non-POPs alternatives, HIL has already planned to diversify its products. The proposed project will support HIL in the production of the alternatives to DDT where available facilities could be upgraded, new technology scaled up and set up the domestic and commercial production of LLIN, synthetic pyrethroids for LLIN impregnation and Bt-based pesticides. HIL has committed availability of land, manpower and utilities for the proposed project. With the production of goods within the same factories, employment will be maintained and socio-economic issues avoided.
- (b) **National Botanical Research Institute (NBRI)** of Council of Scientific and Industrial Research (CSIR) is a government organization engaged in multi-disciplinary plant research of international repute, undertaking basic and applied R&D programmes in several strategically important areas of plant sciences including plant systematics and biodiversity conservation and environmental biology, horticulture and floriculture, plant-microbial interaction, plant biotechnology, genetic engineering, plant diversity databases and bio-prospection of plant and microbial, resources for health, environment and industry-related products and technologies. CSIR-NBRI is known for its outstanding contributions to enriching the knowledge base on India's plant diversity, particularly in developing globally competent biotech and microbial technologies, herbal products and plant databases. The institute will undertake propagation of new dwarf cultivars of neem with early maturity and high limonoids yield through adoption of tissue culture techniques and large scale clonal propagation through macro propagation. NBRI will scale up the production of neem-based pesticides at the pilot facility and tie up with commercial set up for large scale production under PPP mechanism.
- (c) **National Vector Borne Disease Control Programme (NVBDCP)**: The Directorate of NVBDCP is the central nodal agency responsible for the prevention and control of vector borne diseases i.e. Malaria, Dengue, Lymphatic Filariasis, Kala-azar, Japanese Encephalitis and Chikungunya in India. It is one of the Technical Departments of Directorate General of Health Services, Government of India. NVBCP is equipped with Technical Experts in the field of Public Health, Entomology, Toxicology and parasitology aspects of malaria. The Directorate is responsible for framing technical guidelines and policies as to guide the states for implementation of vector control programme strategies. The Global Fund (GFATM) and the World Bank are the major partners supporting the NVBDCP for its specific activities in focal areas for malaria control and kala-azar elimination in most endemic districts affecting the poorest of the poor residing in inadequate and unhygienic housing. WHO is another important partner providing technical support and assistance to the programme in various forms. The supply of alternative to DDT would be procured by NVBDCP and then distributed and applied in different states in the country. NVBDCP will be engaged in the implementation of IVPM in the field and to organize and impart training for promotion of IVPM in the country.
- (d) **National Institute of Malaria Research (NIMR)**, established in 1977 as 'Malaria Research Centre' and renamed as 'National Institute of Malaria Research' in November 2005, is an autonomous body under the Department of Health Research, MoHF&W. The primary task of the Institute is to find short term as well as long term solutions to the problems of malaria through basic, applied and operational field research. The Institute also plays a key role in man power resource development through trainings/workshops and transfer of technology. Field evaluation of new insecticides, biolarvicides, insecticide-impregnated bed nets, drugs and parasite diagnostic kits have provided new armament to malaria control. Many of these have found place in national malaria control programme. NIMR has a network of well developed laboratories in Delhi carrying out research on all aspects of malaria along with 10 field laboratories in malaria endemic areas, which serve as testing ground for new technologies and help in the transfer of technologies. NIMR will provide technical support in efficacy trials and field evaluation of alternative interventions developed by HIL and IPFT as these are the mandatory requirements before introduction of any new intervention tool in the operational malaria control programme managed by NVBDCP.
- (e) **Institute of Pesticide Formulation Technology (IPFT)**, an autonomous institution under the MoCF has been working towards the development of safer, efficient and environment friendly pesticide formulations. IPFT also aimed to promote efficient application technologies suiting the exacting requirement of newer formulations,

undertake scaleup projects on the production of newer formulations such as Suspension Concentrates, Water Dispersible Granules (Including floating Granules), Capsule Suspensions, Concentrated Emulsions, microemulsions, gel formulations, tablet formulations (including floating tablets), etc. IPFT has well established laboratory, pilot plant facility, manpower and expertise to develop and scale up the manufacturing process on semi-commercial level of user and environment friendly new generation formulations of synthetic as well as botanical pesticides. IPFT has developed a large number of formulation of synthetic pyrethroids, which would be utilized in the impregnation of LLIN. It has also developed formulation technologies, which have already been successfully transferred to different pesticide industry in India and abroad for commercialization. A number of Neem based formulations have been developed at laboratory scale as a safer alternative to synthetic pesticide formulations. The Institute has also screened bio-synergists to improve the bioefficacy of neem pesticides that can be utilised as alternative to DDT. In the project implementation, the neem based pesticide formulations would be improved with respect to its physio-chemical properties with enhanced bio-efficacy and knockdown effect. Also, the technology would be scaled up to the industrial level for commercialization of the neem based pesticides.

PROJECT ORGANOGRAM



B.2 Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund/NPIF) or adaptation benefits (LDCF/SCCF):

97. The attempt to replace DDT is primarily targeted through the use and promotion of bacteria based biopesticides and neem based botanical pesticides for vector control, which are entirely biodegradable and environmentally friendly. The only area where chemicals are considered is for the impregnation of the LLINs where synthetic pyrethroids will be used that are considered as green chemicals due to their very limited toxicity and high biodegradability.
98. One of the notable socioeconomic benefits is creating job opportunities that would improve the living standards of village communities, particularly for women and unemployed young in the collection, depulping and drying of neem ripe fruits. It is estimated that India has about 20 million neem trees and a single tree yields 50 kg of neem fruit. The cost of 1 kg of neem fruit is INR 20. Therefore, the potential of neem business for farmers (collectors) is about INR 20,000 million (approx. US\$ 350 million). The profitability could go up many folds (around 15 times) once the neem processing is undertaken commercially. Other benefits are the low price of biobotanical pesticides, very low or lack of toxicity of pesticides, the biodegradability of alternatives to DDT, and take back arrangements with LLIN vendors.
99. The increasing green cover due to new neem plantations and its intensive monoculture in community land, revenue land, farm land, private land, unused land along the roads, in the abandoned mines and waste lands, which are unfit for agricultural activities, will, as an additional benefit, contribute to increased land productivity through

improvement in the affected ecosystem of the degraded land mass as well as mitigating climate change and desertification. Changes in climatic conditions would affect the biology and bionomics of the vectors of malaria, hence strategy to control malaria vector need to be suitably adjusted. The sustained backward linkages of sourcing neem as basic ingredients leans good reason to go ahead with the proposal to deal with any unforeseen impact of climate change on vector control in the future. Instead of relying on single chemical constituents where resistance development is easy to build, the changeover to biobotanical pesticides such as neem based pesticides is considered as a good strategy. The neem based pesticides has built multi-defense mechanism, which prevents development of pesticide resistance. Also neem base pesticides are biodegradable and environmentally friendly, hence fits well in the climatic change scenario.

100. The core concerns and objectives of the proposed project have been focused to production and promotion of neem and other biobotanical pesticides for vector control. However, given the complexity and inter-connected issues around the use of non-POPs alternatives in areas beyond vector control, it has to be understood that any positive benefits both tangible and intangible could be seen as welcome additions that will further enhance the acceptability of the project by the population at large.
101. The use of neem is very limited compared to the application of DDT. To timely implement the proposed project, therefore, a very large number of neem trees should be planted that could not be achieved without the intensive use of the tissue culture techniques, which is an accepted intervention under the GEF. The vector control is the “acceptable purpose” by the Stockholm Convention under which DDT can legally be used, but a part of it is illegally applied in the farm sector as inexpensive and effective pesticide. Most of the latter cases, however, can be regarded borderline cases as it might be difficult to make a distinct differentiation between DDT use at vector breeding areas and cultivated land in close vicinity to rivers, lakes, wetlands or other water bodies. Due to this socioeconomic and political sensitivity introducing alternatives to DDT and phasing out DDT should be approached in a very cautious and considerate manner. Component 4 is to implement such an approach with its advocacy for showcasing the benefits of alternatives in rural/farmer communities supported by a considerate regulatory and enforcement mechanism.
102. The concept of Farmer's Field School (FFS), which is a participatory approach to disseminate, evaluate, fine tune and adopt the best production technologies suitable to location specific conditions and resources available with the farmers, will be used. A group-based learning system that includes hands-on training methods (including communication skills, skills in identification and problem solving, leadership, interaction and discussion methods) will be facilitated by NGOs and civil society groups.
103. Employment of women and children in agriculture increases the risks for exposure to harmful chemicals. For this reason, addressing the gender dimensions, mainstreaming and analysis (macro level, meso level and mapping of relevant partners, counterpart and stakeholders) related to health effects of the alternatives, discriminated impacts and alternative to approaches will be an integral part of the proposed project. Women and vulnerable groups of the population will be engaged in the project activities at sector level (ministries and industries) at the stakeholder level (participation in PSC and TWG) and at the information and awareness raising on protection against malaria.

B.3. Explain how cost-effectiveness is reflected in the project design:

104. The project aims to provide an innovative 3-pronged approach to decrease the reliance on DDT that are proven and well known for their environmentally sound and safe features. Other developing countries and countries with economies in transition will benefit from this experience as they could adopt similar technologies. Moreover, the transfer of environmentally sound technologies for manufacture of non-POPs alternatives to DDT will provide a financially comparable alternative to DDT use in the country that would eventually lead to the gradual phase out of the currently 6,000 MT DDT produced and used in India and such discontinue its environmental burden. To quantify global environmental benefits, the project will record the amount of DDT not produced and used and the amount of uPOPs avoided by reducing the production of DDT.

C. DESCRIBE THE BUDGETED M & E PLAN:

105. Monitoring and evaluation will facilitate tracking implementation progress toward the outcomes and objectives. Likewise, it will facilitate learning, feedback, and knowledge sharing on results and lessons among the primary stakeholders to improve knowledge and performance. This section of the project document presents a concrete and fully budgeted monitoring and evaluation plan of the project.

Table 12: Monitoring and evaluation budget and timeframe

Type of M&E activity	Responsible Parties	Budget USD*	Time frame
1. Project implementation			
Establish Project management structure including National Project Coordination Unit (NPCU)	UNIDO, UNEP, MoEF, MoCF, MoHF&W	(covered under PMC)	Within the first two months of project start
Inception Workshop (IW) and inception report	UNIDO, UNEP, NPCU, MoEF, MoCF, MoHF&W	40,000	Within first three months of project start up
Regular monitoring and analysis and review of results indicators	UNIDO, UNEP, NPCU, MoEF and M&E consultants as required	covered under PMC and reporting below	Regularly to feed into project management and Annual Project Review , Mid-term Review and Terminal Project Evaluation
Project Steering Committee Meeting	NPCU, UNIDO, UNEP and NSC	75,000*	Annually coincide with the Annual Project Review and whenever an urgent and important decision that need approval of the Steering Committee
Technical Working Group (TWG) Meetings	NPCU, UNIDO, UNEP, MoEF, MoCF, MHF&W, external consultants	60,000*	Every six months or whenever required
Lessons learned (based on review of resultss)	NPCU, UNIDO, UNEP, external consultants	90,000	By the end of project implementation; annual as part of PIR
Visits to field sites	UNIDO, UNEP, NPCU, MoEF, MoCF, MHF&W	45,500*	Back-to-back with meetings of NPCU or TWG; preferentially annually
Establishment of Project Management Information System	NPCU	20,250	Throughout project implementation
Final report and dissemination		118,750	Towards 2 nd half of year 5
2. Regular project implementation reporting according to UNIDO/UNEP rules and regulations			
Half-annual progress reports	Executing agency partners	90,000	every half year on 30 June and 31 December

Type of M&E activity	Responsible Parties	Budget USD*	Time frame
Project Implementation Reviews (PIRs)	NPCU to prepare prior to the annual project review UNIDO, UNEP to validate and finalize to submit to GEF	(excluding preparation of PIRs)	Annually starting after second year (date: 30 June)
Annual Project Review to assess project progress and performance	NPCU, UNIDO, UNEP and NSC to review the project performance and make corrective decision		Annually prior to the finalization of APR/PIR and to the definition of annual work plans
Mid-term Review	NPCU to initiate in consultation with UNIDO, UNEP, external consultant (India)	30,000	After year three of implementation
Terminal Project Evaluation	UNIDO, UNEP, external evaluators	68,000	Evaluation at least one month before the end of the project; report at the end of project implementation
TOTAL indicative cost <i>* Excludes project team staff time and UNIDO/UNEP staff and travel expenses</i> <i>** The costs are covered under Project Management Costs</i> <i>***Maybe supplemented from the Project management cost</i>		637,500	

Project Inception Phase

106. The project Inception Phase will involve the establishment of the Project Steering Committee (PSC), National Project Coordination Unit (NPCU), augmentation of the National Steering Committee (NSC), the project launching through an Inception Workshop (IW) and convening of the first PSC meeting. The IW is aimed at launching the project with the full project team, relevant government counterparts, co-financing partners, key stakeholders, UNEP, UNIDO and representatives from the Regional Offices, as appropriate. This will provide the platform to disseminate project objectives, general workplan and implementation structure to relevant stakeholders.
107. The 1st PSC is aimed at convening the project team to better understand and assimilate the goals and objectives of the project, as well as to finalize the preparation of the project's first annual work plan on the basis of the project's results framework matrix. This work will include reviewing the results framework as necessary (indicators, means of verification, assumptions), imparting additional detail as needed, and completing an Annual Work Plan (AWP) for the first year of project implementation, including measurable performance indicators.
108. Additionally, the meeting will: (i) introduce project staff to the UNIDO/UNEP team, which will support the project during its implementation; (ii) delineate the roles, support services, and complementary responsibilities of UNIDO/UNEP staff vis-à-vis the project team; (iii) provide a detailed overview of UNIDO/UNEP reporting and Monitoring & Evaluation (M&E) requirements, with particular emphasis on the content and format of the Annual Project Implementation Reviews (PIRs), the Annual Project Report (APR), the AWP, meetings, as well as mid-term and final evaluations. Equally, the IW will provide an opportunity to inform the project team on UNIDO/UNEP project related administrative and financial procedures, budgetary requirements and reviews and mandatory budget rephrasing. In the course of the project, the structure of the project's Management Information System (MIS) will be also introduced.
109. The 1st PSC will also provide an opportunity for all parties to understand their roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines and conflict resolution mechanisms. Specific targets for the first year implementation progress indicators together with their means of verification will be developed and agreed in this workshop. These will be used to assess whether implementation is proceeding at the intended pace and in the right direction and will form part of the AWP.
110. The Inception Report will be drafted and circulated for comments and approval by project partners within one month from the meetings.

Monitoring and Implementation

111. One month before the starting of each implementation year, the NPCU will draft the AWP, complying with requirements and formats established for the 1st AWP at IW. The AWP will be submitted to UNIDO/UNEP for approval. The AWP will set the target against which project performance shall be measured at the end of each implementation year.
112. Day to day monitoring of project implementation progress at the national level will be the responsibility of the National Project Director (NPD) based on the project's AWP and its indicators. The NPD will coordinate the planning and monitoring activities with the National Project Coordinator (NPC). The NPCU, via the NPD will inform UNIDO/UNEP of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely and remedial fashion.
113. Targets and indicators will be reviewed annually as part of the internal evaluation and planning processes undertaken by the NPCU.
114. UNIDO/UNEP and/or UNIDO Regional Office will conduct periodic visits based on agreed schedule to be detailed in the project's IR/AWP to assess project progress. Mission reports will be prepared by UNIDO/UNEP on each corresponding visits and will be circulated to the project team.
115. Annual Monitoring will occur through NSC meetings, which will take place at least once every year. The NPD will prepare an Annual Project Report (APR) and submit it to UNIDO/UNEP at least two weeks prior to the NSC for review and comments.
116. The first relevant results indicator is the amount (in metric tons) of DDT that is annually used in the country. Currently, approximately 6,000 MT of DDT is used annually in India and that volume will gradually decrease as the production and application of alternatives are scaled up. The other relevant impact indicators are the increasing production volume of DDT alternatives manufactured through this project. The decreasing consumption of DDT and the increasing use of alternative products will provide insights not only on project results, but also on the future sustainability of the project outcomes. The introduction of viable alternatives to DDT in disease vector control will be build on a robust legal framework and adequate guidelines to provide the Government, the authorities in environment, public health and agriculture with a solid basis for sustainable implementation. The introduction of the alternatives will be diffused through IVPM trainings and implementation reporting.

Table 13: Key result indicators

Key Result Indicator	Baseline	Target (at Year 5)	Means of Verification	Frequency of verification	Location
Decreased annual volume of DDT used	6,000 MT	5,000 MT	Orders arrived to HIL	Annually after the second year of implementation	HIL
Updated guidelines and processes for approval of alternatives to DDT	Domestically manufactured LLINs not approved	Expedited process in place for domestic WHOPEs approvals	Certificate of approval	Progres monitoied with one approval for each application	MoEF, MoC&F and MoHF&W
Increased annual distribution of LLIN	6.5 million	16,000 million	Production records	Annually after the second year of implementation	HIL
Increased annual production volume of neem-based botanical pesticides formulations	nil	various formulations such as coil, cream, spray to capture of USD 25 million	Production records	Annually after the second year of implementation	MoC&F

Increased annual production volume of Bt-based biopesticides	nil	480 MT of technical powder per annum	Production records	Annually after the second year of implementation	HIL
Population capable to apply IVP; no increase in malaria incidence	Will be determined at project start	No increase in malaria incidence	reporting by health authorities	annual statistics	three agroclimatic zones
Improved living standards of village communities	will be determined during project implementation	Increased income generation of farmers out of the products of neem plantation and increased land productivity through improvement in the affected ecosystem for the degraded land	report by farmers / stakeholders concerned	annual statistics	three agroclimatic zones

Terminal Project Workshop

116. The terminal project meeting will be held in the last month of project operation. A draft final report will serve as the basis for discussions in the final workshop. This will serve as a venue to consider the implementation of the project as a whole, paying particular attention to whether the project has achieved its stated objectives and contributed to the broader environmental objective. It decides whether any actions are still necessary, particularly in relation to sustainability of project results and acts as a means, which lessons learned can be captured for use in other projects under implementation or formulation.

Project Monitoring Reporting

117. The national project team in conjunction with UNIDO/UNEP will be responsible for the preparation and submission of the following reports that form part of the monitoring process.

(a) Inception Report

118. A Project Inception Report (IR) will be prepared immediately following the Inception phase. It will include a detailed First Year Work Plan divided into quarterly timeframes, which detail the activities and progress indicators that will guide the implementation during the first year phase of the project. The Work Plan will include the tentative dates of specific field visits, support missions from UNIDO/UNEP and/or UNIDO/UNEP consultants, as well as timeframes for meetings of the project's decision-making structures. The report will also include the detailed project budget for the first full year of implementation, prepared on the basis of the AWP, and including any monitoring and evaluation requirements to effectively measure project performance during the targeted 12 month timeframe.

(b) Project Implementation Report (PIR)

119. The PIR is an annual monitoring process mandated by the GEF. It is an essential management and monitoring tool for project managers and offers the main vehicle for extracting lessons from ongoing projects. Once the project will be under implementation for a year, the project team shall complete the PIR. The PIR can be prepared any time during the year (July-June) and ideally, immediately prior to the PSC. The PIR should include the following: (a) Analysis of the achievement of project objectives; (b) Analysis of project performance over the reporting period, including outputs produced and information on the status of the outcome; (c) Management of Risks (d) Co-financing accounting (resources provided both as in kind or cash contribution). Expenditure reports, lessons learned and recommendations to address key problems, if applicable, maybe reported. The PIR shall also

constitute the annual project report of the project. The annual progress report is a UNIDO/UNEP requirement and part of the UNIDO/UNEP central oversight, monitoring and project management.

Independent Evaluations

120. The project will be subjected to at least two independent external evaluations as follows:

- (a) **Mid-term Evaluation:** An independent Mid-Term Evaluation will be undertaken at the end of the third year of project implementation. The Mid-Term Evaluation, performed by an independent consultant, will measure progress made towards the achievement of outcomes and will identify corrections if needed. The evaluation will focus on the project performance in terms of relevance, effectiveness, efficiency and timeliness of project implementation; highlight issues requiring decisions and actions; and present initial lessons learned on project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the second half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this mid-term evaluation will be prepared jointly by UNIDO and UNEP in accordance with the generic TORs developed by the GEF Evaluation Office.
 - (b) **Final Evaluation:** An independent Final Evaluation will take place after the operational completion of the project, and will focus on the same issues as the mid-term evaluation, with a greater focus on project results and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The Final Evaluation should also provide recommendations for follow-up activities future projects, based on lesson learned and success stories. The Terms of Reference for this evaluation will be prepared jointly by UNIDO and UNEP in accordance with the generic TORs developed by the GEF Evaluation Office.
121. A Project Management Information System will be established to support the Project Manager and the project management team to ensure that all the project activities be completed on time, in quality and within budget. The MIS will include a database containing (in electronic format or scanned PDF) all the project technical and administrative documentation. The MIS will keep baseline records of AWP and contracts with consultants and subcontracts with performance indicators, result reports, responsibilities and budgets, allowing the easy comparison of them with the progress of the activities.

General Consideration

122. According to the Monitoring and Evaluation policy of the GEF, UNIDO and UNEP, follow-up studies including Country Portfolio Evaluations and Thematic Evaluations can be initiated and conducted. All project partners and contractors are obliged to (i) make available studies, reports and other documentation related to the project and (ii) facilitate interviews with staff involved in the project activities.

Prior Obligations and Prerequisites:

123. The project document will be signed by UNIDO and the Government of India. GEF assistance will be provided subject to UNIDO being satisfied that obligations and pre-requisites listed below have been fulfilled. When fulfillment of one or more of these pre-requisites fails to materialize, UNIDO may, at its discretion, either suspend or terminate its assistance.

Prior to project effectiveness: Legally binding co-financing agreements are signed for stakeholders participation in the project.

During project implementation: Quarterly progress reports, annual project reports and Project Implementation Review reports (PIRs) as well as measure impact indicators should be prepared. The workplan and consequently the budget will be updated annually.

Within one year of start of project implementation: Annual audited financial reports should be prepared and submitted to GEF

Legal context:

124. The Government of the Republic of India agrees to apply to the present project, mutatis mutandis, the provisions of the Revised Standard Technical Assistance Agreement concluded between the United Nations and the specialized Agencies and the Government on 31 August 1956 and as amended on 3 October 1963.
125. The following types of revisions maybe made to this project document with the signature of the project manager, provided he or she is assured that the other signatories of the project document have no objection to the changes as follows:
- Revision in, or addition of, any of the Annexes of the project document; and
 - Revisions that do not involved significant changes in the immediate subcomponents, objectives, outcomes or activities of the project, but are caused by rearrangement of the inputs already agreed to or by caused increases due to inflation.

PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT(S) ON BEHALF OF THE GOVERNMENT(S):
 (Please attach the Operational Focal Point endorsement letter(s) with this form. For SGP, use this OFP endorsement letter).

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Mr. Shashi Shekhar	Additional Secretary and India's GEF Operational Focal Point	Ministry of Environment and Forests	05/27/2014

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for CEO endorsement/approval of project.

Agency Coordinator, Agency Name	Signature	Date (Month, day, year)	Project Contact Person	Telephone	Email Address
Mr. Philippe R. Scholtès, Managing Director, Programme Development and Technical Cooperation Division - PTC, UNIDO GEF Focal Point		March 11, 2015	E. Galvan 	+431 26026 3953	e.galvan@unido.org
Ms. Brennan VanDyke Director, GEF Coordination UNEP		March 11, 2015	Kevin Helps Task Manager	+41 22 917 8195	jorge.ocana@unep. org

ANNEX A: PROJECT RESULTS FRAMEWORK (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

Hierarchy of Objectives	Objectively Verifiable Indicators	Baseline	Target	Sources of Verification	Assumptions
<p>Project Objective: To introduce bio- and botanical pesticides and other locally appropriate cost-effective and sustainable alternatives to DDT as first step for reduction and eventual elimination of dependency on DDT, ensuring food safety, enhancing livelihood and protecting human health and the environment.</p>	<ul style="list-style-type: none"> • Gradually decreased use of DDT on the basis of availability of locally appropriate cost-effective and sustainable alternatives • Population capable to apply IVPM • No increase in malaria incidence • Improved living standards of village communities 	<ul style="list-style-type: none"> • Current DDT production in India is 6,000 MT • Lack of industrial scale application of neem-based pesticides • Lack of domestic manufacture of Bt-based pesticides formulations • Lack of domestic manufacture of LLIN 	<ul style="list-style-type: none"> • DDT production decreased by 5000 MT after the project intervention • Domestic manufacture of active ingredients and LLIN formulation starts at HIL • Domestic manufacture of Bt-based pesticides active ingredient production and formulation starts at pilot demonstration site • PPP arrangements for commercial scale production of newly developed neem-based pesticides formulation • Increased income generation for farmers out of the products of neem plantation • Improvement in the affected ecosystem of the degraded land mass 	<ul style="list-style-type: none"> • DDT country reporting to Stockholm Convention Secretariat • HIL production records • MoHF&W reports • Project progress reports • Project annual reports • Project mid-term report • Project final report 	<ul style="list-style-type: none"> • Enabling environment created by incentives promoting non-POPs locally appropriate, cost effective and sustainable DDT alternatives • Properly collected neem seeds are available in required quality and quantity • Indigenous isolates of Bt are available • LLIN production technology available at HIL • Dwarf cultivars with early maturity and higher limonoid yield are available for micropropagation

<p>Outcome 1: Efficient system for fulfilling legal requirements at the various stages of the lifecycle of alternatives to DDT</p>	<ul style="list-style-type: none"> • Work plan for approval procedures in place for fulfilling legal requirements throughout the lifecycle of alternatives to DDT 	<ul style="list-style-type: none"> • Legal requirements in place but they need to be harmonized, improved and consolidated under a single umbrella hence the length of administration processes cannot be controlled 	<ul style="list-style-type: none"> • Two year long administration process for fulfilling legal requirements 	<ul style="list-style-type: none"> • User satisfaction survey • Final external evaluation report 	<ul style="list-style-type: none"> • Political commitment to system changes must be in place • Local and central authorities are facilitating harmonized fast-track registration
<p>Output 1.1: Regulatory mechanisms throughout the lifecycle of alternatives to DDT in place. Activity 1.1.1: Establish an inter-ministerial working group to follow and guide the implementation of the activities. Activity 1.1.2: Identify the legal requirements at each stage of the lifecycle for the alternatives to DDT. Activity 1.1.3 Identify gaps in the legal framework throughout the lifecycle for the alternatives to DDT Activity 1.1.4: Identify the potential for strengthening and streamlining the legal requirements at each of the stages of the lifecycle</p>	<ul style="list-style-type: none"> • Work plan developed for introducing regulatory mechanism • Drafting of the mechanism, the official approval and adoption of the mechanism • The regulatory mechanism is in effect 	<ul style="list-style-type: none"> • No working group exist addressing alternatives to DDT at national level • Regulatory guidelines not available for the lifecycle approach 	<ul style="list-style-type: none"> • One working group established to put together and officially endorse the consolidated regulatory mechanism • Regulatory guidelines for alternatives in place 	<ul style="list-style-type: none"> • Documentations prepared by the working group • Evaluation report of existing legislation and guidelines • Publication of the regulatory mechanism in official websites such as Ministerial website 	<ul style="list-style-type: none"> • Each institution assigns one member to the working group • Workplan implemented accordingly • Local and central authorities are partners in fast-tracking or at least shortening the administration procedures of registration
<p>Output 1.2: Guidance documents for producers, registration holders and users on the legal requirements for alternatives to DDT</p>	<ul style="list-style-type: none"> • Guidance documents developed and tested • Mechanisms to expedite registrations for 	<ul style="list-style-type: none"> • No guidance document for the legal requirements for alternatives to DDT available 	<ul style="list-style-type: none"> • 3 guidance documents for neem, 1 for Bt and 1 for LLIN covering full lifecycle • Efficient and fast 	<ul style="list-style-type: none"> • Copies of guidelines reflecting different alternatives available • Final guidance document 	<ul style="list-style-type: none"> • Full cooperation of all stakeholders • Guidance will facilitate fulfillment of legal requirements

<p>developed</p> <p>Activity 1.2.1: Develop guidance documents for producers, registration holders and users on the legal requirements for alternatives to DDT</p> <p>Activity 1.2.2: Testing by potential user of the guidance.</p> <p>Activity 1.2.3: Finalize the guidance documents for alternatives to DDT</p>	<ul style="list-style-type: none"> o neem coils o neem larvicide, o neem-based IRS application o Bt cell self-spreading formulation for larvae; and o domestic LLIN manufacture and use as well as end-of-life handling of LLIN o end-of-life LLINs, handling 	<ul style="list-style-type: none"> • Lack of domestic production of DDT alternatives at industrial scale 	<p>fulfillment of the legal requirements for alternatives to DDT</p> <ul style="list-style-type: none"> • Domestic production appropriate cost-effective and sustainable alternatives to DDT established 	<ul style="list-style-type: none"> • DDT country reporting to Stockholm Convention Secretariat • HIL production records • MoHF&W reports 	<p>within reasonable timeframe</p> <ul style="list-style-type: none"> • Enabling environment created by incentives promoting non-POPs locally appropriate, cost effective and sustainable DDT alternatives
<p>Outcome 2:</p> <p>Development and efficient pilot production of bio-and botanical pesticides as well as other alternatives to DDT ready for enhancement to large scale production</p>	<ul style="list-style-type: none"> • Number of pilot production lines established for DDT alternatives 	<ul style="list-style-type: none"> • No domestic production of neem-based self surface spreading, cream, suspension concentrate and mosquito coil formulations 	<ul style="list-style-type: none"> • One (1) facility scaled up for production of neem-based pesticides • Ten (10) pilot plants for neem-based pesticides strengthened through technology transfer • Number of individuals employed • Training materials prepared • Number of 	<ul style="list-style-type: none"> • Facilities commissioning and trial runs reports • Reports on facility scaled up • Reports on setting up of up to 10 pilot plants • Training workshop reports 	<ul style="list-style-type: none"> • Required capacity for technical training in producing neem extract and formulations available • PPP arrangements agreed upon timely for technology transfer • Environmental clearance for pilot
<p>Output 2.1: Existing Neem sheds scaled up for production of Neem-based botanical pesticides through PPP model</p> <p>Activity 2.1.1: Existing facilities scaled up for self surface spreading, cream, suspension concentrate and mosquito coil formulations</p> <p>Activity 2.1.2: Prepare design and layout for 10 pilot facilities</p>	<ul style="list-style-type: none"> • Domestic large scale production of neem-based self surface spreading, cream, suspension concentrate and mosquito coil formulations established 	<ul style="list-style-type: none"> • No domestic production of neem-based self surface spreading, cream, suspension concentrate and mosquito coil formulations 	<ul style="list-style-type: none"> • One (1) facility scaled up for production of neem-based pesticides • Ten (10) pilot plants for neem-based pesticides strengthened through technology transfer • Number of individuals employed • Training materials prepared • Number of 	<ul style="list-style-type: none"> • Facilities commissioning and trial runs reports • Reports on facility scaled up • Reports on setting up of up to 10 pilot plants • Training workshop reports 	<ul style="list-style-type: none"> • Required capacity for technical training in producing neem extract and formulations available • PPP arrangements agreed upon timely for technology transfer • Environmental clearance for pilot

			individuals trained		facilities received timely
<p>Activity 2.1.3: Set up 10 pilot facilities under PPP</p> <p>Activity 2.1.4: Technology transfer</p> <p>Activity 2.1.5: Carry out technical training in producing neem extract and formulations</p> <p>Output 2.2: One (1) Bt-based bio-pesticides pilot production facility meeting international operational standard established in the governmental sector</p> <p>Activity 2.2.1: Cooperate with an internationally accepted institution in identification of indigenous strains for production</p> <p>Activity 2.2.2: Develop formulations using local strains suiting the 3 agroclimatic zones for self surface spreading, suspension concentrate and wettable powder</p> <p>Activity 2.2.3: Develop a long-term cooperation with such an internationally accepted institution for specific technical training programs required</p> <p>Activity 2.2.4: Liaise with such an internationally accepted institution to plan and prepare a blueprint of one (1) pilot facility in India</p> <p>Activity 2.2.5: Set up one (1)</p>	<ul style="list-style-type: none"> • Large scale production of Bt-based biopesticides established 	<ul style="list-style-type: none"> • Lack of domestic based self surface spreading, suspension concentrate and wettable powder formulations 	<ul style="list-style-type: none"> • One (1) pilot plant for Bt-based bio-pesticides established and operational • Number of individuals employed • Conformity with the international standards • Training materials prepared • Number of individuals trained 	<ul style="list-style-type: none"> • Facility commissioning and trial runs reports • Study tour reports; • Training workshop reports • Technical progress reports from the 3 agroclimatic zones 	<ul style="list-style-type: none"> • Long-term cooperation is timely agreed upon with an internationally accepted institution • Indigenous isolates of Bt are available for adapting • R&D capacity to improve production strains are available • Environmental clearance for pilot facility received timely

<p>pilot facility meeting international standards.</p>					
<p>Output 2.3: Domestic LLIN production potential scaled up and operational at one (1) site in the governmental sector</p> <p>Activity 2.3.1: Identify quality criteria for LLIN formulation and production</p> <p>Activity 2.3.2: Prepare the specifications and layout of pilot plants for active ingredient production and LLIN formulation</p> <p>Activity 2.3.3: Set up and make operational the above pilot plants</p> <p>Activity 2.3.4: Carry out technical training in LLIN production</p>	<ul style="list-style-type: none"> • Synthetic pyrethroid based LLIN production established 	<ul style="list-style-type: none"> • No domestic production of LLIN 	<ul style="list-style-type: none"> • One (1) LLIN pilot plant established • Terms of Reference for technology transfer • WHOPE approval obtained • Number of individuals employed • Training materials prepared • Number of individuals trained • Strategy on take back mechanism of end-of-life LLINs 	<ul style="list-style-type: none"> • Evaluation reports of technology transfer offers; • Facility commissioning and trial runs reports; • Certificate of WHOPE approval • Training workshop reports 	<ul style="list-style-type: none"> • Basic technology for bed nets as well as synthetic pyrethroids available • Environmental clearance for pilot facilities obtained
<p>Output 2.4: Business model for alternatives developed, promoted and marketed</p> <p>Activity 2.4.1: Develop business model for LLIN including strategy for the environmentally sound and cost-effective “cradle to grave” mechanism for end-of-life LLINs</p> <p>Activity 2.4.2: Develop business model for neem based mosquito coil, larvicide (self surface spreading and suspension</p>	<ul style="list-style-type: none"> • Business plan to facilitate production of alternatives to DDT developed • Awareness raising plans in place 	<ul style="list-style-type: none"> • Business models for DDT alternatives not available • No awareness raising materials in local languages available 	<ul style="list-style-type: none"> • Pilot plants set up in line with three (3) business models • Awareness raising campaigns undertaken 	<ul style="list-style-type: none"> • Business plans submitted for government approval • Information and training materials in local languages prepared 	<ul style="list-style-type: none"> • Business models are not creating conflict of interest among stakeholders • Social acceptance and language barriers

<p>concentrate) and mosquito repellent (cream) Activity 2.4.3: Develop business model for Bt-based pesticides and their formulations Activity 2.4.4: Awareness raising on the safety, socio-economics and acceptability of DDT alternatives</p>	<ul style="list-style-type: none"> Established criteria for new dwarf cultivars with early maturity and higher limonoid yield 	<ul style="list-style-type: none"> Lack of neem-plantations using improved cultivars 	<ul style="list-style-type: none"> Training courses successfully implemented Neem plantations using improved cultivars established 	<ul style="list-style-type: none"> Project technical reports Project progress reports Project annual reports 	<ul style="list-style-type: none"> Awareness raising campaigns supported by all relevant authorities for achieving a country-wide outreach
<p>Outcome 3: Promotion of new dwarf cultivars with early maturity and higher limonoids yield for large scale cultivation</p> <p>Output 3.1: New cultivars with high yielding limonoids propagated using tissue culture technology Activity 3.1.1: Identify criteria for selection of four (4) sites for micro-propagating new cultivars Activity 3.1.2: Prepare design and layout for 4 pilot facilities for tissue culture technology Activity 3.1.3: Set up 4 pilot facilities</p>	<ul style="list-style-type: none"> Dissemination of new improved cultivars included in Farmer's Field Schools training programs - Micropropagation of new neem cultivars established 	<ul style="list-style-type: none"> Lack of dissemination of new improved cultivars Lack of micropropagation of new neem cultivars 	<ul style="list-style-type: none"> Four (4) sites for micropropagation of neem cultivars Number of seedling prepared Number of seedlings planted 	<ul style="list-style-type: none"> Training modules; Training workshop reports; Study certificates; Facilities commissioning and trial runs reports; Production records; Plantation reports. 	<ul style="list-style-type: none"> Awareness raising timely carried out dwarf cultivars with early maturity and higher limonoid yield are available for micropropagation
<p>Outcome 4: Central and State Governments endorse implementation of Integrated Vector Pest Management (IVPM)</p>	<ul style="list-style-type: none"> IVPM application ongoing and reported to WHO 	<ul style="list-style-type: none"> No harmonized and updated materials available 	<ul style="list-style-type: none"> IVPM successfully implemented and ongoing 	<ul style="list-style-type: none"> Reports on IVM application/success visible in news/media 	<ul style="list-style-type: none"> Cooperation of all partners at local, State, and central levels

<p>policies / strategies</p> <p>Output 4.1: IVPM developed, promoted and pilot tested in selected sites <i>Activity 4.1.1:</i> Prepare specific training modules for promoting IVPM at local level <i>Activity 4.1.2:</i> Develop practical training courses for promoting IVM in a train the trainers course <i>Activity 3.1.3:</i> Carry out pilot training (test the training materials and adapt where necessary)</p>	<ul style="list-style-type: none"> • At least four (4) IVPM guidance materials available and tested 	<ul style="list-style-type: none"> • Lack of dissemination of IVPM on the lifecycle of alternatives to DDT • Lack of coherent and updated IVPM materials • Present IVPM is not exhaustive 	<ul style="list-style-type: none"> • Four (4) training modules developed • Four (4) training materials prepared • Number of trainers trained • At least ten (10) pilot tests undertaken 	<ul style="list-style-type: none"> • Training modules available • Training materials translated into local languages where necessary • Reports/certificates of trainers successfully completed the training • Report from pilot testing in at least 3 agroclimatic zones 	<ul style="list-style-type: none"> • Availability of the domestically manufactured LLINs in sufficient quantity • Availability of the neem-based products • Availability of Bt-based products • WHOPEs approval in place
<p>Outcome 5: Monitoring of project interventions and evaluation of results</p>	<ul style="list-style-type: none"> • Monitoring and results indicators and M&E program in place 	<ul style="list-style-type: none"> • All elements of PIF incorporated in FSP 	<ul style="list-style-type: none"> • Project outcomes achieved 	<ul style="list-style-type: none"> • Project progress reports • Project annual reports • Project mid-term report • Project final report 	<ul style="list-style-type: none"> • Monitoring and results indicators and M&E program agreed by all government stakeholders timely
<p>Output 5.1: Technical reporting prepared and made available at each stage of the project <i>Activity 5.1.1:</i> Carry out annual project financial audits, prepare annual project progress reports and Project Implementation Reports <i>Activity 5.1.2 :</i> Establish project management information system for dissemination of relevant data / information</p>	<ul style="list-style-type: none"> • All project partners, donors, and stakeholder informed about content and achievements of the project • All technical reporting 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Project implemented and results assessed against the set of indicators • Terminal report submitted 	<ul style="list-style-type: none"> • Monitoring reports • Progress reports • Audit reports • Annual reports and PIRs • Terminal report published 	<ul style="list-style-type: none"> • Timely implementation of the project

<p>Activity 5.1.3: Prepare and Complete Terminal Report</p>	<ul style="list-style-type: none"> • Project implementation monitored and results assessed against set of indicators • M& E mechanism in place 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Inception workshop held • SC augmented • NPCU established and staffed • Detailed workplan prepared • Financial audit completed • Annual TPR meetings held • Bi-annual NSC meeting held • Final workshop held 	<ul style="list-style-type: none"> • Delays in project implementation and low quality performance are avoided
<p>Output 5.2: Project implementation and M& E mechanism in place</p> <p>Activity 5.2.1: Organize and hold inception workshop</p> <p>Activity 5.2.2: Augment National Steering Committee (NSC), establish Project Steering Committee (PSC), National Project Coordination Unit (NPCU), recruit National Project Coordinator and other project staff</p> <p>Activity 5.2.3: Hold annual tripartite review / Project Steering Committee meetings</p> <p>Activity 5.2.4: Hold national technical working groups meetings</p> <p>Activity 5.2.5: Carry out awareness raising and final stakeholder workshop for dissemination of lessons learnt</p>	<ul style="list-style-type: none"> • Project implemented and evaluated 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Report of mid term evaluation approved • Report of final evaluation approved 	<ul style="list-style-type: none"> • Cooperation of all stakeholders • All activities performed • Budget for evaluation
<p>Output 5.3: Project evaluation</p> <p>Activity 5.3.1: Carry out independent Mid-term review</p> <p>Activity 5.3.2: Carry out final evaluation</p>	<ul style="list-style-type: none"> • All outputs achieved and documented 	<ul style="list-style-type: none"> • All outputs achieved and documented 	<ul style="list-style-type: none"> • Report of mid term evaluation approved • Report of final evaluation approved 	<ul style="list-style-type: none"> • Delays in project implementation and low quality performance are avoided

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

GEF ID:	4612	
Country/Region:	India	
Project Title:	Development and Promotion of non-POPs alternatives to DDT	
GEF Agency:	UNIDO and UNEP	GEF Agency Project ID:
Type of Trust Fund:	GEF Trust Fund	GEF Focal Area (s):
GEF-5 Focal Area/LDCF/SCCF/NPIF Objective (s):		CHEM-1, CHEM-1, PMC
Anticipated Financing PPG:	\$300,000	Project Grant:
Co-financing:	\$40,000,000	Total Project Cost:
PIF Approval Date:	January 26, 2012	Council Approval/Expected:
CEO Endorsement/Approval:		Expected Project Start Date:
Program Manager:	Anil Sookdeo	Agency Contact Person:
		E. Galvan

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion ⁵	Secretariat Comment At CEO Endorsement(FSP)/Approval (MSP)	UNIDO/UNEP RESPONSES
Eligibility	<p>1. Is the participating country eligible?</p> <p>2. Has the operational focal point endorsed the project?</p>	<p>Partially. India has ratified the SC, however, the NIP for India has not been submitted to the Stockholm Convention Secretariat. Please note that if the NIP has not been submitted by the time of CEO endorsement the project will not be considered.</p> <p>19/10/2011 – India’s NIP has now been registered by the SSC. Comment cleared</p> <p>Yes</p>	Yes	

*Some questions here are to be answered only at PIF or CEO endorsement. No need to provide response in gray cells.
⁵ Work Program Inclusion (WPI) applies to FSPs only. Submission of FSP PIFs will simultaneously be considered for WPI.
 GEF5 CEO Endorsement Template-February 2013.doc

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP)/Approval (MSP)	UNIDO/UNEP RESPONSES
Agency's comparative Advantage	3. Is the Agency's comparative advantage for this project clearly described and supported?	Yes	Yes	
	4. If there is a non-grant instrument in the project, is the GEF Agency capable of managing it?	No	No	
	5. Does the project fit into the Agency's programme and staff capacity in the country?	UNEP – unclear what technical staff capacity exists in The ROAP office to provide backstopping to this project. Please clarify 19/10/2011 – comment cleared, however if at any time project funds will be used for UNEP staff to provide services to the Government of India, there must be written authorization from the Government of India and this must be submitted with the terminal report of the project should it be approved.	Yes	
Resource Availability	6. Is the proposed Grant (including the Agency fee) within the resources available from (mark all that apply:			
	- The STAR allocation?	N/A	N/A	
	- The focal area allocation?	N/A	N/A	
	- The LDCF under the principle of equitable access			

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP)/Approval (MSP)	UNIDO/UNEP RESPONSES
Project Consistency	<ul style="list-style-type: none"> - The SCCF (Adaptation or Technology Transfer)? - Nagoya Protocol Investment Fund - Focal area set-aside? 			
	7. Is the project aligned with the focal / multifocal areas / LDCF/SCCF/NPIF results framework?	Unclear why Outcome 1.1.2 and 1.3.1 have been identified in this project. 19/10/2011 – these have been deleted from the PIF.	Yes, the project responds to the elimination of POPs, specifically DDT in vector control.	
	8. Are the relevant GEF 5 focal / multifocal areas / LDCF / SCCF/NPIF objectives identified?	See comment above 19/10/2011 – cleared	Yes	
Project Consistency	9. Is the project consistent with the recipient country's national strategies and plans or reports and assessments under relevant conventions, including NPFE, NAPA, NCSA or NAP?	No NIP submitted. 19/10/2011 – The NIP has been recorded at SSC and the NIP identifies phase out of DDT as a priority. Comment cleared.	Yes	
	10. Does the proposal clearly articulate how the capacities developed, if any, will contribute to the sustainability of project outcomes?	No 19/10/2011 – Comment not addressed. 6/12/2011 – Comment addressed - cleared	Yes	
	11. Is (are) the baseline project(s), including problem(s) that the baseline project(s) seek/s to address, sufficiently described and based on sound data and assumptions?	No. See comments in Section 30 19/10/2011 – the comment has not been addressed. The baseline situation has been described, but the baseline project that seeks to address this at a national level has not been described.	Yes	

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP)/Approval (MSP)	UNIDO/UNEP RESPONSES
Project design		<p>The baseline project is linked with the baseline financing of the project. Without a baseline project being described the case for incremental costs cannot be made and therefore a basis for providing GEF resources to cover the incremental cost of achieving the global environmental benefits is not evident.</p> <p>6/12/2011 – The baseline project has been clarified. In the elaboration of the FSP very clear descriptions of the baseline activities will be needed to be included in the project. – Comment cleared.</p>	Yes	
	<p>12. Has the cost-effectiveness been sufficiently demonstrated, including the cost-effectiveness of the project design approach as compared to alternative approaches to achieve similar benefits?</p>		Yes	
	<p>13. Are the activities that will be financed using GEF / LDCF/SCCF funding based on incremental / additional reasoning?</p>	<p>Cannot assess without a baseline project.</p> <p>19/10/2011 – A baseline project to address the situation described in the baseline situation has not been described. The reasoning for incremental cost has therefore not been made.</p>	Yes	

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP)/Approval (MSP)	UNIDO/UNEP RESPONSES
		6/12/2011 – Comment addressed.	Yes	
	14. Is the project framework sound and sufficiently clear?	No. See comments in Section 30 19/10/2011 – It still unclear how the components will be implemented and what constitutes the activities to be funded from the GEF grant. 6/12/2011 – comment cleared	Yes	
	15. Are the applied methodology and assumptions for the description of the incremental / additional benefits sound and appropriate?	No, there is no baseline described and therefore no incremental reasoning to arrive at incremental benefits. 19/10/2011 – Comment not cleared 6/12/2011 – Comment cleared	Yes	
	16. Is there a clear description of: a) the socio-economic benefits, including gender dimensions, to be delivered by the project, and b) how will the delivery of such benefits support the achievement of incremental / additional benefits?	See comments on Section 30. 19/10/2011 – The response to this leads to further concerns that the GEF is being asked to pay for non-eligible activities, which is replacement of other chemicals other than DDT used in other sectors. 6/12/2011 – Issues clarified in response – comment cleared	Yes	

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP)/Approval (MSP)	UNIDO/UNEP RESPONSES
	17. Is public participation, including CSOs and indigenous people, taken into consideration, their role identified and addressed properly?	Yes	Yes	
	18. Does the project take into account potential major risks, including consequences of climate change and provides sufficient risk mitigation measures? (i.e. climate resilience)	Climate Change risks should be considered with this type of project. Please see comments in Section 30 19/10/2011 – Comment not addressed 6/12/2011 – Comment cleared	Yes	
	19. Is the project consistent and properly coordinated with other related initiatives in the country or in the region?	Yes	Yes	
	20. Is the project implementation / execution arrangement adequate?	Not defined in the PIF. Please provide. 19/10/2011 – not addressed 6/12/2011 – comment addressed, cleared	Yes	
	21. Is the project structure sufficiently close to what was presented at PIF, with clear justifications for changes?		Yes, Minor modifications have been made that have improved the design and clarified the roles of the two implementing agencies.	

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP)/Approval (MSP)	UNIDO/UNEP RESPONSES
Project Financing	22. If there is a non-grant instrument in the project, is there a reasonable calendar of reflows included?		N/A	
	23. Is funding level for project management cost appropriate?	No. See comments in Section 30 19/10/2011 – Addressed	Yes	
	24. Is the funding and co-financing per objective appropriate and adequate to achieve the expected outcomes and outputs?	No. See Comments in Section 30 19/10/2011 – while there is an increase in the levels of co-financing and an explanation provided that there will be asset transfers without real cash flows, please clearly describe in the development and establishment of the Neem production facilities what it will cost to construct these facilities and the source of financing for this and what the TA grant from the GEF will cover. 6/12/2011 – The clarification provided are satisfactory – comment cleared	At the time of the PIF review the issue of co-financing was raised. The proponents indicated in the responses to the GEFSEC review that the types would be confirmed during the PPG stage. This submission re-opens the question of adequacy of the resource package to achieve the objectives of the project. Over 75% of the co-financing package is classified as “in-kind”. It is expected that there will be the need for sufficient cash resources to make the necessary technological changes and in this regard it appears this project cannot be implemented with the current financing package.	<p>28 February 2015: The alternatives to DDT comprising of the production, storage and delivery of Long Lasting Insecticidal Nets (LLIN), <i>Bacillus thuringiensis</i> (Bt) based products and neem based products would be produced at the existing facilities of the Hindustan Insecticides Limited (HIL) currently engaged in the production, storage and distribution of DDT. HIL has extensive facilities comprising of land, effluent treatment facilities, storage and laboratory facilities at its two facilities located in Rasayani (State of Maharashtra) and Udyogmandal (State of Kerala). Also, the National Botanical Research Institute (NBRI), an institution under the Council of Science and Industrial Research (CSIR), Government of India is in a possession of extensive land, building, infrastructural facilities and laboratories at their headquarters in Lucknow and their sub-stations distributed around India. The Hindustan Insecticides Limited (HIL) under the Ministry of Chemicals and Fertilizers is a Government of India institution and so is the NBRI under CSIR, Ministry of Science and Technology.</p>

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP)/Approval (MSP)	UNIDO/UNEP RESPONSES
				<p>Therefore, the primary requirement for the production, storage and distribution of LLIN, Bt and neem based products would be taken care of in the facilities already existing in the country, replacing the existing production of DDT and its formulations, hence, the co-financing package would be utilised mainly to supplement the requirements in the setting up of the technical facilities for the production of LLIN, Bt and neem based pesticides in the following areas:</p> <ul style="list-style-type: none"> ▪ Provision of land for setting up the facilities ▪ Setting of the building/workshops for the production facilities ▪ Laboratory facilities ▪ Effluent treatment facilities ▪ Provision of utilities, viz. power, water etc. ▪ Provision of manpower for undertaking the project activities ▪ Provision of storage facilities for the alternatives to DDT. ▪ Undertaking of field trials at different locations in malaria endemic areas ▪ Provision of land for neem plantation and Neemsheds <p>For undertaking the above-mentioned activities, the proponents feel that co-financing, both in-kind and in cash, as presented in the project document is appropriate as majority of the requirements are already available/in place with the participating institutions and classified as in-kind contribution.</p>

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP)/Approval (MSP)	UNIDO/UNEP RESPONSES
	<p>25. At PIF: comment on the indicated co-financing; At CEO endorsement: indicate if confirmed co-financing is provided.</p>	<p>There seems to be no real cash co-financing for this project and it is difficult to understand what 35.9 m of in-kind co-financing is paying for. Even is the 9.1 m identified as unknown materializes as cash, we are very doubtful how in particular the technology transfer components will be implemented. Further comments in section 30.</p> <p>19/10/2011 – see additional comments in 24 above.</p> <p>6/12/2011 – comments cleared</p>		<p>It should be noted that the Government entities partnering to the project receive their funding from the National Budget. While the co-financed project activities will require redirection of these budget funds, separating the cash co-financing without similar provision in their national approved budget is complicated. A solution for this is being sought; meanwhile this contribution as currently labelled as “in-kind” actually contains fresh budgetary resources and can be compared to the “equity” contribution type of co-financing introduced only in GEF-6. By Mid-term Evaluation, a solution will be found and the contribution can then be reported during the project implementation as “cash” to meet the ultimate objective of the project.</p> <p>The above has been explained in Table C page 3 and pages 20-21, para 78 of the project document.</p> <p>28 February 2015: As stated in the response to Q,24 above, the financing package, as proposed, will be able to achieve the objectives of the project.</p>

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP)/Approval (MSP)	UNIDO/UNEP RESPONSES
Project Monitoring and Evaluation	26. Is the co-financing amount that the Agency is bringing to the project in line with its role?	No 6/12/2011 – comment cleared	Yes	
	27. Have the appropriate Tracking Tools been included with information for all relevant indicators, as applicable?		Yes	
	28. Does the proposal include a budgeted M&E Plan that monitors and measures results with indicators and targets?		Yes	
	29. Has the Agency responded adequately to comments from: - STAP? - Convention Secretariat - Council comments? - Other GEF Agencies?	None received None received None received None received	Yes, clearance was received from the STAP on this project	
Agency Responses	Secretariat Recommendation			
	30. Is PIF clearance / approval being recommended?	This PIF has major issues, both technical and financial. Please revise the PIF and re-submit before final decision is made. General: 1. The wrong template has been used. 19/10/2011 – Addressed Project Design: 1. Component 2 “is this all TA or		
Recommendation at PIF Stage				

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP) /Approval (MSP)	UNIDO/UNEP RESPONSES
		<p>is there actual investment in building the manufacturing facilities. Will there be any industrial conversion / closure of the DDT manufacturing plants as a result of this project and development of new manufacturing technology?</p> <p>19/10/2011 - comment somewhat addressed, but as indicated in section 24 above, it is unclear what is being established and how it will be financed and how the TA Grant from the GEF will be used.</p> <p>2. Please describe what will be done in this activity and what constitutes the technical assistance. 19/10/2011 – the activities that constitute the technical assistance has still not been described. In fact all of the activities described in the response to this comment are investment activities, for example, establishment of pilot production, etc.</p> <p>3. Has an effective evaluation of Neem and Biological controls being proposed been done and an evaluation of the environmental fate of it in the environment? Has a cost benefit analysis been done to justify the use of these technologies? Is there sufficient study on the application of these botanical pesticides? Please clarify and provide these reports as well as a summary of findings. 19/10/2011 – comment addressed</p>		

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP) /Approval (MSP)	UNIDO/UNEP RESPONSES
		<p>4. How will LLIN be dealt with at the end of life? 19/10/2011 – while no conclusion on how to treat these nets at the end of life has been reached, in a country where the usage will be significant, a plan for at least collecting and storing of these at the end of life should be developed otherwise this will introduce additional adverse impacts on the environment.</p> <p>5. Component 3 as written is not eligible for GEF funding since this activity is not specific to replacement of DDT, however, if there is already a project designed to improve the yield of the Neem Plant through tissue culture, then the incremental cost for boosting the yields to compensate for replaced DDT could be considered. 19/10/2011 – the proponents have not addressed the question. The point raised in the review is that boosting of the yields is beneficial to replacing DDT, but there are also other uses for Neem, which as indicated in the PIF includes agriculture, etc. where according to the NIP, the use of DDT has already been banned so that any benefits to other sectors needs to be financed by those sectors. We would appreciate more effort be put into the costing of these components and separating what is incremental from the baseline project.</p> <p>Please provide the reports made to the Stockholm Convention Secretariat and the WHO on the usage of DDT, the conditions for such use and the relevance to India's disease</p>		

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP) /Approval (MSP)	UNIDO/UNEP RESPONSES
		<p>management strategy. 19/10/2011 – the data supplied is not the reports that India should be submitting to SCS. Please provide the data as requested.</p>		
		<p>National Strategies:</p> <ol style="list-style-type: none"> 1. NIP should be final at time of CEO endorsement. 19/10/2011 – addressed <p>Baseline Project:</p> <ol style="list-style-type: none"> 1. No baseline project has been defined. Additionally, the baseline project is funded from other resources but there is greater than 90% of the additional funding being in-kind and unknown. Is this realistic? For example, in component 2 there is a significant amount of co-financing being indicated but if these funds are not realized how would the component function? <p>19/10/2011 – the comment has not been adequately addressed as indicated in section above. Please quantify what is meant by “a lot of cash flow” If there is cash being used please amend the co-financing tables to reflect reality.</p> <ol style="list-style-type: none"> 2. Please clearly define what the baseline project is and how the GEF funding will achieve the Global Environmental Benefits through funding of incremental activities. 19/10/2011 – Not addressed. From the response, it would appear that the baseline project is the GEF project which cannot be the case. <p>Socio-economic Benefits: Development and promotion of non-POPs alternatives for vector control only will be</p>		

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP) /Approval (MSP)	UNIDO/UNEP RESPONSES
		<p>acceptable under this project. How will “promotion of non-chemical means of food production ensure national food safety concerns” be a benefit to this project if the project is only designed to address vector control? 19/10/2011 – While this is good, the costs for replacing chemicals other than DDT should be met by the sectors that benefit from a neem based pesticide.</p>		
		<p>Project Risks: 1. Please identify risks to the long term outcome of this project due to climate change including changes to the vector habitats that may occur. 19/10/2011 The response does not address the question raised, which is how would change in climatic conditions impact the areas that the currently prone to malaria and would in the future new areas need to be dealt with and how the project takes this into account. Outline of coordination with other related initiatives: 1. Please clarify para 16 line 3 – what is non-alternative to DDT? 19/10/2011 – cleared Project funding: 1. The co-financing is below what is expected. 19/10/2011 – based on the responses provided please quantify all the cash flows into the project so that the levels per component can be evaluated. 6/12/2011 – cleared 2. We have a strong concern that the</p>		

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP) /Approval (MSP)	UNIDO/UNEP RESPONSES
		<p>majority of co-financing (>90%) is in-kind. If this is not cash then the project cannot be implemented since the baseline project should form the bulk of the project. In this regard, please clearly indicate what the co-financing will be paying for. 19/10/2011 – we note that the GOI has a 52.5 million set aside for POPs, however, how much of this will be used for this project? 6/12/2011 – cleared</p> <p>3. Agencies were guided on a number of occasions on the level of PM costs that should be applied to projects exceeding 2M in GEF funding. The PM costs are well above this level and we request that it be reduced to the threshold or lower or a detailed justification on the costs and the reasons for the cost be provided. 19/10/2011 – cleared</p> <p>4. Please provide a breakdown of the costs for Component 4 and what is being budgeted for in this component. 19/10/2011 – in light of the responses provided, there is triplication of effort among the three agencies. Why is a policy advocacy group needed and how is this an incremental cost to phasing out DDT in India? The sharing of results should be part of the knowledge management of the agencies and the reports of the project. In this regard please remove this component.</p> <p>19/10/2011 There are still a large number of unanswered questions and serious concerns about the viability of this project. The proponents are requested to review</p>		

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP) /Approval (MSP)	UNIDO/UNEP RESPONSES
		<p>carefully the entire review sheet, do additional work on quantifying the costs of the project, properly and clearly defining the baseline project and developing the incremental reasoning before resubmitting the project. A major revision of the project will be required before resubmission.</p> <p>6/12/2011 While the PIF indicates co-financing in-kind, it is clear that this will be cash from national budgets of GOI and provision of land, materials and other resources. In this regard the co-financing is clear. Component 4 should be removed and the overall budget should be limited to 10M. Please revise accordingly. 10/1/12 – Comment addressed – cleared</p> <p>Please provide in a separate document a complete breakdown by agency of the work to be done by agency and the associated request. 10/1/12 – Comment addressed – cleared. Additionally FAO has dropped out of the project, but the component that FAO was to implement has been taken over by UNIDO in consultation with UNEP.</p> <p>Jan 10, 2012, All comments addressed and project can be recommended</p>		
	<p>31. Items to consider at CEO endorsement /approval.</p>	<p>1. The description of the baseline project is clearly elaborated. 2. The quantification of the resources being put in as co-financing needs to be clearly indicated.</p>		<p>Noted</p> <p>22 December 2011: Please find below our responses as follows: The quantification of co-financing is clearly depicted component-wise vis-à-vis GEF grant in the PIF. At this state, it is not appropriate to go into details of</p>

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP) /Approval (MSP)	UNIDO/UNEP RESPONSES
		<p>3. Legislative provisions for banning the production and export of DDT from India.</p> <p>4. In the description of the current situation and background a detailed analysis of export of DDT to other countries, internal usage, etc must be provided.</p>		<p>financing activity-wise. This will be done at the PPG stage while drafting the project document.</p> <p>The question of legislative provision for the banning of DDT production would be taken up with the start up of this proposed project and pursued strongly to coincide with the commercialization of the new products and technologies procured through the TA grant. This would comprise of new varieties of LLIN impregnated with state of the art synthetic pyrethroids as well as neem based botanical and Bt based bio-pesticides to stand as effective alternative to DDT.</p> <p>India exports DDT 75% WP to African countries (see para 10 of the PIF). The export in 2006 to 2009 was as follows: Mozambique: 2006/07 – 430,140kg, 2007/08 – 612,690 kg and 2008/09 – 165,180 kg Eritrea: 2006/07 – 1,500 kg Gambia: 2007/08 – 8,000 kg</p> <p>The annual supply of DDT 50% WP to NVBDCP for internal usage was as follows in MT: 1990-1991 - 12844.950 1991-1992 - 11733.500 1992-1993 - 11525.000 1993-1994 - 12752.400 1994-1995 - 8533.800 1995-1996 - 10850.000 1996-1997 - 8206.200 1997-1998 - 8542.000 1998-1999 - 6800.000 1999-2000 - 7500.000 2000-2001 - 7000.000 2001-2002 - 6150.000 2002-2003 - 6042.000</p>

Review Criteria	Questions	Secretariat Comment at PIF (PFD)/Work Program Inclusion	Secretariat Comment At CEO Endorsement(FSP) /Approval (MSP)	UNIDO/UNEP RESPONSES
				2003-2004 - 8208.000 2004-2005 - 8500.000 2005-2006 - 8560.000 2006-2007 - 6825.000 2007-2008 - 6000.000 2008-2009 - 6821.000 Response to this comment is given under project design. This specific activity will not be financed from GEF resources.
Recommendation at CEO Endorsement/ Approval	32. At endorsement/approval did Agency include the progress of PPG with clear information of commitment status of the PPG?	5. Take back program for the LLIN clearly defined. - this should not be funded from GEF resources but is essential to the environmental impact of the project.	Yes	
	33. Is CEO endorsement/approval being recommended?		Pending the following: 1. The agency and proponent are to clarify how the financing package, which is primarily in-kind contributions, will achieve the investments needed for this project. 2. Please include a section in the proposal the responses to section 31 in the PIF review.	28 February 2015 1. As mentioned under response to Q24, the major amount of co-financing envisaged in terms of investment for the project is primarily in place in terms of land, laboratory, effluent treatment facilities, workshop, manpower, utilities, etc. and considered as in-kind contribution of the proponents. Therefore, the agencies are convinced that the finance package is sufficient to achieve the targets set for the project. A detailed breakdown of in-kind and cash contributions are given in Annex E. 2. The comment has been addressed on page 8-9, tables 2 & 4 as well as para 62, page 17 of the project document.

Review Date (s)	First review*	September 06, 2011	November 12, 2014	28 February 2015
	Additional review (as necessary)	October 19, 2011		
	Additional review (as necessary)	December 06, 2011		

* This is the first time the Program Manager provides full comments for the project. Subsequent follow-up reviews should be recorded. For specific comments for each section, please insert a date after comments. Greyed areas in each section do not need comments.

Request for PPG Approval

Review Criteria	Decision Points	Program Manager Comments
PPG Budget	<p>1. Are the proposed activities for project preparation appropriate?</p> <p>2. Is itemized budget justified?</p>	<p>Please include an assessment of socio-economic impacts the project will have due to change in land use planning. Also include what safeguards will be put in place to protect workers in both the cultivation aspects of the neem plant and the processing of the bio and botanical products.</p> <p>No, the amount being requested is to high, particularly with the dropping of one agency. Please revise the request to no more than \$200,000.</p> <p>June 4th, 2012 – The justification provided for maintaining the costs at the proposed level are not sufficient. The proponent may wish to provide a quantitative justification to show the costs required. This project was approved for further development based on part on the baseline project proposed in the project. This baseline project should have been constructed with much of the data that is being proposed in the PPG.</p>
Secretariat recommendations	<p>3. Is PPG approval being recommended?</p>	<p>1. Please increase the level of co-financing of the PPG</p> <p>2. Provide how many consultants are being hired in Annex A of the PPG</p> <p>6/12/2011 – a revised PPG and response to comments have not been provided to date.</p> <p>26/1/12 – Comments addressed</p> <p>June 4th 2012 – The questions on the budgets are not satisfactorily addressed.</p> <p>November 16, 2012 – After an extensive teleconference with the project partners and clear justifications provided in the revised PPG request, it is understood that significant on the ground effort in remote areas would be required to complete the preparation of this project. There has been a 30,000 reduction in the PPG budget which is consistent with the newly approved PPG levels for project over 10M. In this regard the PPG can be recommended.</p>
	<p>4. Other comments</p>	
Review Date(s)	<p>First review*</p> <p>Additional review (as necessary)</p>	<p>September 06,2011</p> <p>November 16, 2012</p>

STAP comments to PIF and UNIDO/UNEP responses as follows:

<p>STAP Review</p>	<p>UNIDO/UNEP responses</p>
<p>(i) There is an underlying and erroneous presumption throughout the proposal that neem has few or no toxicological effects. While there is limited literature on the side effects of neem in humans, there are published concerns in the scientific literature that suggest that the precautionary principle should be adopted (see Boeke S.J. et al. 2004. Safety evaluation of neem (Azadirachta indica) derived pesticides. Journal of Ethnopharmacology. Volume 94, Issue 1, Pages 25â€41). What does seem most often indicated is that neem has contraceptive effects (affecting both males and females), that it can cause large impacts in children causing effects similar to aspirin-induced Reye's syndrome, and that care should be taken to minimize ingestion of concentrated oils. Therefore, given the fact that:</p> <ul style="list-style-type: none"> a) the cultivars proposed carry higher limonoid concentrations; b) children often accompany their mothers as they engage in economic activity; c) children sometimes assist their parents in such activity. <p>One might expect that this should be mentioned in the risk section (B.4), that there be some directed research to support the project on both toxicological effects and ways of minimising the risks, along with a clear plan to address appropriate training of workers in handling the neem kernels to prevent inadvertent poisoning, as well as other secondary problems that might arise from more potent neem cultivars. Exposure of children should especially be noted.</p>	<p>UNIDO/RENAP has been pursuing the development of Neem Kernel Aqueous Extract (NKAE) as pest control agent since 1997 with the financial assistance from UNDP and the Government of India. At no stage, neem oil would be used as a direct alternative to DDT. The use of neem oil in vector management is different compared to the application of DDT. Proponents are aware of the literature reported contraceptive effect of neem oil in combination with other chemicals. Though no neem oil would be handled in the preparation of the neem based NKAE based pesticides yet the precautionary principle would be adopted. The risks highlighted in the STAP'S comments regarding its use as an alternative to DDT is mainly based on a review article of <i>Boeke S.J. et al. 2004, which is primarily focused on stored grain pests using unprocessed material, seed oil, non-aqueous extracts and pure compounds.</i></p> <p>The NKAE production technology has been perfected during the last decade through extensive scientific studies and undertaking large number of field trials. Using the review findings of the quoted article, we found little relevant in view of the fact that NKAE is an aqueous extract of the neem kernels especially prepared and processed in large scale production facilities and made available to the users in selected cloth bags/muslin bags, like tea bags, for application. The conclusion as quoted in para 4.2 of the review article of <i>Boeke S.J. et al 2004</i> on the effect of aqueous extracts on animals is "<i>in most cases beneficial rather than harmful effects</i>".</p> <p>For the registration of pesticides in India, the Registration Committee calls for toxicological evaluation of the pesticide by reputed institutes and for this purpose, we got the toxicological evaluation done by the Government of India accredited laboratory viz. Industrial Toxicology Research Centre (ITRC), Lucknow, a laboratory under the Council of Scientific and Industrial Research (CSIR).</p> <p>The overall recommendations made, based on the findings are that the NKAE is safe and no toxicity noted even at 2000 mg per kg body weight. During the studies carried out, the standard protocol has been developed for the collection, storage, preparation and processing as well as actual application in the field based on extensive field level trials and demonstrations, which is proposed to be adopted during the proposed project. Therefore, the likely increased content of limonoids in the neem kernels would not come in the way of safety of the NKAE based products.</p>

<p>Children would in no way be exposed to the NKAE as they would never come near the processing facilities where the neem kernels would be powdered and put in bags. It is not the intention of the proposed project to allow children and other target groups to unintended ingest uncontrolled amounts of concentrated oils (which would otherwise never be extracted during the processing of neem based pesticides).</p> <p>The children accompanying their mothers would only be in the collection of the ripe fruits, which will not expose them to the NKAE processing and preparation.</p> <p>In view of the much elaborated studies carried out at a significant cost by the ITRC, the project proponents concluded that no further studies are called for on the toxicological aspects of the NKAE.</p>	
<p>In India Neem is seldom found in the forest or in larger cultivations. It is mostly grown as an avenue or shade tree and in variety of habitats. The Indian subcontinent has nearly eighteen million Neem trees. Most of them line the roadsides or are found clustered around markets or backyards and provide great relief from the sun. Neem grows to height of about 20 meters and a girth of 2.5 meters. It grows well on dry, stony, clayey and saline soils. It has a strong root system that extracts nutrients and moisture from poor soils. The proposed project has not suggested and will not push for “displacement of other uses and forms of agriculture”.</p>	<p>(ii) In much the same way, one might consider competing land use possibilities for biofuels, the project should have a clear methodology for addressing the acknowledged sensitivities that will undoubtedly be associated with intensive cultivation of neem, and displacement of other uses and forms of agriculture.</p>
<p>It will simply improve the Neem cultivar and intensify the Neem cultivation and propagation following the great acceptance and ownership of the Neem in the Indian society already for thousands of years.</p> <p>Land use possibilities are yet another area considered during the project phase and the focus would be on 30 million hectares of land, which has been identified by the Ministry of Environment and Forests, (MOEF) under Joint Forest Management for non-forest area (such as community land, revenue land, farm land, private land). Therefore, it will not be displacing other use and forms of agriculture.</p> <p>There would be no displacement of human habitation hence would not create ecological, economical and social risks.</p> <p>Of course introduction of new Neem cultivars through intensive cultivation on suitable lands and areas will be done with caution. The project suggests dissemination through Farmer’s Schools. It should be noted that Neem is one of the proposed alternatives to DDT. Compared to the current DDT use in India, the application of Neem in vector control is nearly negligible. As such, there is still a long way to go to further introduce and improve Neem while reducing the DDT use.</p>	<p>The project design requires systematic monitoring of the impact on the small-farm productive sector, especially in terms of dry land crops displaced and the effects on human nutrition and social relationships. Gender issues will need to be examined thoroughly. Displacement creates ecological, economic and social risks, and the risk and stakeholder profiles should be adjusted to suit.</p>

<p>(iii) The project appears to build on past work that proves the worth of neem as a pesticide. However, this research and development work is not referenced, nor is it referred to especially in establishing risks. STAP will need to see a full evaluation based on preferably peer-reviewed studies that the approach to be used in this project is scientifically-valid and that the resistance potential to neem has been assessed. The project promotes a paradigm shift in anti-malarial practice from DDT to an alternative.</p> <p>Verification and considered scientific proof is needed that neem will indeed perform as expected?</p> <p>It would be good if this could be opened for review and discussion.</p>	<p>The project will promote a range of alternative interventions, which are currently known in vector control. The use of Neem is one of those alternatives and India is well placed to promote Neem as it is an indigenous species for India.</p> <p>There is a scientific proof that DDT in most parts of India is not performing due to wide spread vector resistance.</p> <p>There is scientific proof that ‘alternatives’ will perform in vector control, otherwise WHO would not promote them. The proposed project will promote a range of alternatives, including Neem, but certainly not excluding chemical alternatives (not being POPs) for vector control.</p> <p>WHO has approved a range of alternative chemical products, which can be applied for vector control. The proposed project is not to provide scientific proof as this is not a targeted research project.</p> <p>Concerning the further promotion of Neem, please note that the Government of India strongly promotes the further production of Neem.</p> <p>As mention in the PIF, facilities are already set up under the “<i>Development of Eco-friendly Neem based Pesticides</i>” project of the Government of India with the investment of US\$ 3.0 million. Peer review on the scientific evidence on neem as pesticide in vector control is attached as annex to the project document.</p> <p>The purpose of the proposed project is to promote alternatives to DDT while at the same time reducing the production of DDT. This is in line with the objective of the Stockholm Convention, which was ratified by the Government of India. The research and development work referred in the proposed project, which has been carried for over a decade would form the base of the Full-sized Project.</p> <p>The project does not envisage intensive monocultures of Neem. The correct modality will follow as a result of the interactions with the target groups through the Farmers’ Field School concept.</p>
<p>In terms of Global Environment Benefits (GEB), STAP questions the claim that neem cultivation will bring positive benefits, especially as related to enhanced carbon sequestration. There is no consideration in the proposal of land degradation or sustainable land management issues. Replacing ground cover by trees without attention to conservation techniques such as interplanting has been shown in places to accelerate erosion, loss of carbon and nutrients and increase flood risks. Intensive monocultures of trees or any crop generates environmental impacts that need to be assessed carefully and systematically. At the very least, an impact audit of environmental effects needs to be instituted, but this should preferably be supported</p>	<p>There is no mention in the proposal that the Neem cultivation would especially bring benefits to enhanced carbon sequestration (although every tree per definition sequesters carbon). The proposal does not mention ‘carbon sequestration’ at all. The PIF mentions instead “<i>The increasing green cover due to new Neem plantations will, as an additional benefit, contribute to mitigating climate change, land degradation and desertification</i>”. As such, project proponents and executing partners will indeed take into account environmental effects, which might be triggered by Neem tree planting.</p>

<p>by research into the land use options that could incorporate neem as part of a whole-landscape approach see the GEF5 LD Strategy.</p>	<p>With regard to replacement of ground cover by neem trees and its intensive monoculture is concerned, in addition to community land, revenue land, neem plantation on unused land along the roads in the abandoned mines and waste lands, which are unfit for agricultural activities, the project through the development and promotion of non-POPs alternative to DDT could indirectly add co-benefits by focusing on capacity building through improving community-based agricultural management, and building of technical and institutional capacities in line with GEF-5 LD Strategy.</p>
<p>(iv) Other GEB aspects need to be assessed and fully incorporated into the proposal, including climate change impacts such as a climate resilience needs analysis, as does the impact on biodiversity of neem cultivation and application. Changes in cultivation practices and malaria occurrence/vector distribution should also be addressed.</p>	<p>The proposed project within its funding limits cannot pay attention to all those aspects. Proponents do not understand why “changes in malaria occurrence /vector distribution” should also be addressed at this moment of time. These changes – if taking place- will be addressed during the execution of the project as these changes might be attributed to one or more of the proposed interventions of the project.</p>
<p>(v) Further, STAP is concerned about the impacts on the countries to whom India currently acts as sole provider of DDT. In negotiating the DDT exemption under the Stockholm Convention, producers and consumers will have collaborated closely. So if India is the sole producer of DDT, what is to be done for all the other countries that depend on DDT for their own malaria control programmes? This potentially could be a threat to the GEBs generated by these other countries, and could therefore either exacerbate or transfer problems from India to elsewhere.</p>	<p>The DDT production in India will gradually decrease once alternatives are in place. These alternatives or new products developed under the proposed project would be transferred or made available to the countries, which currently import DDT from India. Looking for alternatives to DDT is a step forward for parties to the Stockholm Convention on POPs to meet their obligations. WHO has recommended a range of chemicals, which can be applied in malaria vector control, and DDT is just one of those. There are many others left.</p>
<p>STAP welcomes any opportunity to phase out toxic substances, and there is merit in trying to do so. It is also the right of a country to determine the economic activity in which it wishes to be engaged. But in this instance STAP wishes to emphasize that there needs to be clearer indication (inter alia) that alternatives have been proven to be efficacious, will not result in a host of secondary problems, that there is indeed a community-based strategy to get buy-in to change land use patterns to accommodate intensive neem cultivation, thus better showing readiness for large scale production. More worrying, this project has implications for the Malaria Control Programmes of other countries, and could result in calls for more follow-on GEF and other investment in impacted countries; and so it should not be determined in isolation. However, this project does have a lot of potential as a targeted research project to track the efficacy of complementary and assorted non-DDT alternatives in a large country; and perhaps this might be explored with the country, GEF Sec, STAP et. al.</p>	<p>There is great opportunity, and project proponents (including the government of India) have grasped the possibility. Concerning the so called ‘implications for Malaria control Programs of other countries’ project proponents wish to state to that export of DDT from India is (as mentioned in the PIF) only a small fraction of the national India DDT consumption. Indeed, Parties to the Stockholm Convention have called upon support from GEF to promote alternatives to DDT (project proponents would like to refer to COP5, Geneva, 2011) and various projects to promote alternatives to DDT with Parties, which actually use or intend to use DDT for vector management have been developed. We fully accept the compliment of the STAP in its statement “<i>this project does have a lot of potential as a targeted research project to track the efficacy of complementary and assorted non-DDT alternatives in a large country; and perhaps this might be explored with the country, GEF Sec, STAP et. al.</i>” however, project proponents are not willing to change the current proposal into a</p>

<p>targeted research proposal.</p> <p>Outcome of the project would be shared with other countries, which are currently importing DDT from India, hence are dependent on DDT. It would be good to have complimentary projects in the affected countries and the lessons learnt through this project could be shared in such projects to promote alternatives to DDT on fast track mode to decrease their reliance on DDT and strategically bring in the safer and biodegradable products in the vector control programme.</p> <p>The Institute of Pesticides Formulation Technology (IPFT) and the National Botanical Research Institute (NBRI) have developed appropriate technologies for production of alternatives to DDT. These technologies are being promoted by the National Research Development Council (NRDC) nationally. However, large-scale production has not yet been started. The HIL, sole manufacturer of DDT in India would be ready and willing to take these new technologies as viable alternative to phase-wise replace DDT manufacture. Currently, HIL manufactures DDT less than half of its built-in capacity but further reduction should be economized by introduction of financially viable alternatives. The export capacity would, however, remain to meet the demand of African countries as long as it is deemed necessary.</p>	
<p>We acknowledge STAP's suggestion that the expected outcome should be more precise with a firm formulated Outcome. In the project document, the referred component has been separated into two viz. Component 3 for propagation of new neem cultivars and Component 4 to develop, promote and pilot testing IVPM. Provision of good tracking of the environmental benefits is also included in the project document.</p>	<p>A further point, outside the major points above, concerns the Project Framework. STAP notes that the Expected Outcomes as worded in the proposal are little more than generalized statements of the Expected Outputs. To be valid and to help track a truly beneficial outcome, the Expected Outcomes must highlight the major change to which the Outputs will contribute. So, for example, the Output for Component 3 is the promotion of IPM and new cultivars of neem. The Expected Outcome should address what this promotion will achieve and possibly, a major change in farm practice and uptake of new cultivars rather than a tame re-statement of IPM promotion.</p>
<p>Indicators drawn from GEF Focal area strategies would be suitably adopted for their measurements while finalizing the proposal.</p> <p>The additional benefits could be measured through LD focal area indicators viz improved living standards of village communities through increased income generation out of the products of neem plantation. It is estimated that India has about 20 million neem trees and a single tree yields 50 kg of neem fruit. The cost of 1 kg neem fruits in INR 20. The potential of the neem business for the farmers (collectors), therefore is about INR 20,000 million (approx. US\$ 350 million). The profitability would go up many folds (around 15 times, US\$ 5,250 million) once the neem processing is undertaken commercially.</p> <p>Increased land productivity through improvement in the affected ecosystem of the degraded land mass is also another indicator.</p>	<p>Related to the above point, the proposal is also lacking in indicators of GEBs, and the methodologies and techniques for their measurement. This is now a necessary requirement for all projects funded by the GEF, that tracking of the environmental benefits be fully internalized in the project. The indicators should preferably be drawn from the GEF focal area strategies.</p>

Compilation of comments submitted by Council Members on Intersessional Work Program approved by Council in February 2012

<p>32. India: Development and Promotion of Non-POPs alternatives to DDT (UNIDO/UNEP), (GEF Project Grant: \$10,000,000) <input type="checkbox"/> <i>Canada Comments</i></p>	<p align="center">UNIDO/UNEP response</p>
<p>It seems that this project will duplicate work being done by the Global Alliance for Alternatives to DDT, established by the Stockholm Convention COP in 2009. The STAP has also identified several major revisions, including the presumption that Neem Products (an alternative to DDT) have few or no toxicological effects.</p>	<p>We have since reviewed the response to STAP review and found that there is no need to incorporate any changes after very detailed consideration of various aspects of usage of neem for the control of mosquito larvae and adults. We have also given specific reference to the studies carried out by Indian Toxicological Research Institute, the accredited institution for testing safety of pesticides, which established clearly that neem has no toxicological effects as elaborated under UNIDO's response to STAP review (a), (b) and (c).</p>
<p>Similar projects funded by the GEF have focused on introducing and scaling-up alternatives to DDT, not identifying alternatives within the project.</p>	<p>The proposed project has focused on scaling up of products based on proven technology and does not attempt identification of alternatives by undertaking any formal research work utilizing GEF funds.</p>
<p>Since many of the Disposal projects are very similar, they should strive to include lessons learned in the PIFs. The focus on these projects is on disposing of POPs. However, these projects allocate varied amounts to the specific activity of disposing of POPs. As this is the central activity of the project, the projects should strive to maximize the amount of project resources allocated to POPs disposal activities. There should also be a concerted effort to coordinate the initiatives of countries in the same regions (i.e. Benin and Cameroon) to take advantage of economies of scale and share information on challenges faced and on the resulting improvements for pesticide management. It is promising that these projects are about capacity building and the actual management of POPs, rather than simply updating NIPs.</p>	<p>The proposed project does not include any form of disposal of DDT or POP pesticides as it is focused precisely on production and promotion of non-POPs alternatives to DDT.</p>

Annex C: GEF Project Budget (UNIDO) in USD

Outputs	Budget lines	Description	Y1	Y2	Y3	Y4	Y5	Total
Outcome 2: Development and efficient pilot production of bio- and botanical pesticides as well as other alternatives to DDT ready for enhancement to large scale production								
<i>Output 2.1: Existing Neem sheds scaled up for production of Neem-based botanical pesticides through PPP model</i>	15-00	Project travel	10,000	10,000	10,000			30,000
	17-00	National consultant	12,000	12,000	70,500	22,500		117,000
	21-00	Subcontract	185,000	185,000	220,000	40,000		630,000
	30-00	Training					20,000	20,000
	45-00	Equipment		100,000		200,000		300,000
	51-00	Sundries					3,500	3,500
			Sub-total	207,000	307,000	300,500	262,500	23,500
<i>Output 2.2: One (1) Bt-based bio-pesticides pilot production facility established in the governmental sector meeting international operational standard</i>	11-00	International consultant	36,000	36,000	60,000	12,000		156,000
	15-00	Project travel	19,500	24,000	27,500	10,000		87,000
	17-00	National consultant	9,000	21,000	32,000	2,000		66,000
	21-00	Subcontract			800,000			800,000
	30-00	Training			100,000			100,000
	45-00	Equipment		38,000	750,000	500,000		1,288,000
	51-00	Sundries			4,000			4,000
		Sub-total	64,500	119,000	1,773,500	524,000	20,000	2,501,000
<i>Output 2.3: Domestic LLIN production potential scaled up and operational at one (1) site in the governmental sector</i>	11-00	International consultant	12,000					12,000
	15-00	Project travel	14,500					14,500
	17-00	National consultant	36,000			7,500	7,500	51,000
	21-00	Subcontract	50,000	1,050,000	1,000,000	700,000	100,000	2,900,000
	30-00	Training				40,000	40,000	80,000
	45-00	Equipment	50,000	20,000				70,000
	51-00	Sundries					3,000	3,000
		Sub-total	162,500	1,070,000	1,000,000	747,500	150,500	3,130,500

Outputs	Budget lines	Description	Y1	Y2	Y3	Y4	Y5	Total
Output 2.4: Business model for alternatives developed, promoted and marketed	11-00	International consultant				30,000	30,000	60,000
	15-00	Project travel				41,000	32,000	73,000
	17-00	National consultant				39,000	21,000	60,000
	21-00	Subcontract				50,000	100,000	150,000
	30-00	Training				10,000	10,000	20,000
	51-00	Sundries				2,500	2,500	5,000
		Sub-total				172,500	195,500	368,000
Outcome 3: Promotion of new dwarf cultivars with early maturity and higher limonoids yield for large scale cultivation								
Output 3.1: New cultivars with high yielding limonoids propagated using tissue culture technology and large scale clonal propagation	11-00	International consultant			40,000	4,000	4,000	48,000
	15-00	Project travel			32,000	5,000	4,000	41,000
	17-00	National consultant			38,000	2,000	2,000	42,000
	45-00	Equipment			250,000	55,000	54,485	359,485
		Sub-total			360,000	66,000	64,485	490,485
Outcome 5: Monitoring of project interventions and evaluation of results								
Output 5.1: Technical reporting prepared	11-00	International consultant	6,000	6,000	6,000	6,000	6,000	36,000
	17-00	National consultant	10,000	10,000	10,000	11,500	17,000	58,500
	51-00	Sundries					6,250	6,250
		Sub-total	16,000	16,000	16,000	17,500	35,250	100,750
Output 5.2: Project implementation management and M&E mechanism in place	30-00	Training	21,500	21,500	21,500	1,500	51,500	117,500
	35-00	Workshop	17,500	7,500	7,500	7,500	7,500	47,500
		Sub-total	39,000	29,000	29,000	9,000	59,000	165,000
Output 5.3: Project Evaluation	11-00	International consultant		12,000			12,000	24,000
	15-00	Project travel		10,000			10,000	20,000
	17-00	National consultant		3,000			6,000	9,000
		Subtotal		25,000			28,000	53,000
		TOTAL OUTCOMES 2-4	489,000	1,541,000	3,504,000	1,799,000	576,235	7,909,235

Outputs	Budget lines	Description	Y1	Y2	Y3	Y4	Y5	Total
Project Management Cost	11-00	International Consultant (CTA)	7,200	7,200	7,200	7,200	7,200	36,000
	15-00	Project travel	5,000	5,000	5,000	5,000	5,000	25,000
	17-00	National Project Manager/other project staff	60,000	60,000	60,000	60,000	60,000	300,000
	45-00	Equipment	10,000	8,000	3,000			21,000
	51-00	Sundries	1,250	2,000	2,000	2,000	1,515	8,765
			Total PMC	83,450	82,200	77,200	74,200	73,715
TOTAL UNIDO project budget			572,450	1,623,200	3,581,200	1,873,200	649,950	8,300,000
<i>Agency support costs (10%)</i>								830,000
GRAND TOTAL UNIDO incl. AOS			572,450	1,623,200	3,581,200	1,873,200	649,950	9,130,000

ANNEX D: GEF PROJECT BUDGET (UNEP) in USD

GEF Finance

	BUDGET ALLOCATION BY PROJECT COMPONENT/ACTIVITY *						ALLOCATION BY CALENDAR YEAR **					
	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5	Outcome 6	Year 1	Year 2	Year 3	Year 4	Year 5	Total
	Output 1	Output 2	Output 1	Output 2	Output 2	Output 3	US\$	US\$	US\$	US\$	US\$	US\$
10 PROJECT PERSONNEL COMPONENT												
1100 Project Personnel												
1101 Project coordinator (IND)							40,800	8,160	8,160	8,160	8,160	40,800
1102 Admin assistant							18,360	3,672	3,672	3,672	3,672	18,360
1199 Sub-Total	0	0	0	0	0	0	59,160	11,832	11,832	11,832	11,832	59,160
1200 Consultants w/m												
1201 Finalization of guidance for producers, users, etc.	9,000	42,000		50,000			23,000	15,333	16,667	16,667	16,667	42,000
1202 Development of guidance for IPVM	9,000	14,000		21,000			21,000	7,000	7,000	7,000	7,000	21,000
1299 Sub-Total	9,000	56,000	92,000	21,000	0	0	157,000	43,333	55,833	34,167	23,667	157,000
1600 Travel on official business (above staff)												
1601 Travel Project coordinator/project staff (IND)							15,000	3,000	3,000	3,000	3,000	15,000
1602 National travel (consultants and IND staff)							40,000	8,000	8,000	8,000	8,000	40,000
1699 Sub-Total	0	10,000	40,000	20,000	0	0	85,000	17,000	17,000	17,000	17,000	85,000
1999 Components Total	9,000	66,000	132,000	20,000	0	0	301,160	72,165	84,665	62,999	52,499	301,160
20 SUB-CONTRACT COMPONENT												
2100 Sub-contract to UNEP for technical backstopping and training							0	0	0	0	0	0
a Backstopping and training on legal framework	30,000	20,000	20,000	20,000			50,000	33,333	16,667	16,667	16,667	50,000
b Backstopping and training on LINS	10,000	10,000	10,000	10,000			40,000	26,667	13,333	13,333	13,333	40,000
c Backstopping on DOT (Alternatives)	20,000	30,000	30,000	30,000			50,000	20,000	20,000	20,000	20,000	50,000
d Supervision IVM development and implementation	15,000	50,000	50,000	50,000			15,000	15,000	16,667	16,667	16,667	50,000
e UNEP staff travel to inception WS and TG WG1	15,000	20,000	20,000	20,000			65,000	13,000	13,000	13,000	13,000	65,000
f UNEP annual travel to NSC meetings	5,000	20,000	20,000	20,000			20,000	20,000	20,000	20,000	20,000	20,000
g UNEP staff travel to final results WS	5,000	13,825	13,825	13,825			37,575	108,000	79,667	49,667	90,575	37,575
h Management of Website (UNEP DSSA)	95,000	20,000	143,825	98,750	10,000	10,000	377,575	108,000	79,667	49,667	90,575	377,575
2199 Sub-Total	95,000	20,000	143,825	98,750	10,000	10,000	377,575	108,000	79,667	49,667	90,575	377,575
2200 Sub-contracts (SFA, PCA, non-UN)												
2201 SFA for identification of legal requirements at lifecycle	30,000	20,000	20,000	20,000			30,000	20,000	10,000	10,000	10,000	30,000
2202 SFA for identification of gaps in legal framework	20,000	20,000	20,000	20,000			20,000	13,333	6,667	6,667	6,667	20,000
2203 SFA for identification for strengthening legal framework	30,000	45,000	45,000	45,000			50,000	33,333	16,667	16,667	16,667	50,000
2204 SFA for testing of the guidance	45,000	60,000	60,000	60,000			45,000	15,000	15,000	15,000	15,000	45,000
2205 SFA for IVM application local training courses	100,000	45,000	60,000	60,000			205,000	83,333	20,000	20,000	20,000	60,000
2299 Sub-Total	195,000	65,000	203,825	98,750	10,000	10,000	582,575	189,667	69,667	69,667	90,575	582,575
30 TRAINING COMPONENT												
3200 Group training (field trips, WS, etc)							30,000	42,000	42,000	42,000	42,000	30,000
3201 Organize three clusters of train the trainers							210,000	70,000	70,000	70,000	70,000	210,000
3202 Travel/organization of local training courses (x in 3 agroclimatic zones)	0	0	300,000	0	0	0	300,000	0	0	115,000	70,000	300,000
3300 Meetings/conferences												
3301 Inception workshop for project (UNIDO/UNEP)	40,000	30,000	30,000	30,000			40,000	30,000	10,000	10,000	10,000	40,000
3302 Inception WS for TWG 1	40,000	40,000	40,000	40,000			40,000	40,000	10,000	10,000	10,000	40,000
3303 3 meetings of the intermaterial TWG for CI	50,000	30,000	30,000	30,000			50,000	30,000	10,000	10,000	10,000	50,000
3304 3 meetings of the TWG during CI	40,000	40,000	40,000	40,000			40,000	40,000	10,000	10,000	10,000	40,000
3305 Organize final results/lessons learned WS (UNIDO/UNEP)	90,000	70,000	70,000	70,000			90,000	70,000	21,253	21,253	21,253	90,000
3306 Steering group migs	90,000	30,000	30,000	30,000			90,000	30,000	8,265	8,265	8,265	90,000
3399 Sub-Total	90,000	330,000	330,000	330,000	0	0	496,265	81,253	21,253	21,253	21,253	496,265
50 MISCELLANEOUS COMPONENT												
5200 Reporting costs (publications, maps, NI)							30,000	15,000	15,000	15,000	15,000	30,000
5201 Preparation of information materials (CI)	30,000	90,000	90,000	90,000			90,000	18,000	18,000	18,000	18,000	90,000
5202 Multiplication/diffusion of training materials, publicity	30,000	130,000	130,000	130,000			130,000	65,000	65,000	65,000	65,000	130,000
5203 Final technical report plus publicity	15,000	20,000	20,000	20,000			20,000	5,000	5,000	5,000	5,000	20,000
5204 Translation and interpretation	15,000	15,000	15,000	15,000			15,000	5,000	5,000	5,000	5,000	15,000
5205 Hospitality, miscellaneous	75,000	130,000	130,000	130,000			295,000	54,000	19,000	19,000	19,000	295,000
5299 Sub-Total	75,000	369,000	369,000	369,000	0	0	854,253	397,085	302,918	302,918	302,918	854,253
5500 Evaluation												
5501 Mid-term evaluation (IND)	5,000	5,000	5,000	5,000			5,000	5,000	5,000	5,000	5,000	5,000
5502 Final evaluation (UNEP)	20,000	20,000	20,000	20,000			20,000	20,000	20,000	20,000	20,000	20,000
5599 Sub-Total	0	0	0	0	0	0	25,000	0	0	0	0	25,000
5999 Component Total	75,000	131,000	131,000	131,000	0	0	1,700,000	397,085	302,918	302,918	302,918	1,700,000
TOTAL	369,000	369,000	369,000	369,000	0	0	3,200,000	842,418	842,418	842,418	842,418	3,200,000

ANNEX E: CO-FINANCING BUDGET in USD

Outcome/Output/Activities	MoEF (in-kind)	MoCF/HIL (cash/in-kind)	MoHW&F (in-kind)	NBRI (cash)	NBRI (in-kind)	UNIDO (cash)	UNIDO (in-kind)	UNEP (in-kind)	TOTAL
Outcome 1: Efficient system for fulfilling legal requirements at the various stages of the lifecycle of alternatives to DDT									
Output 1.1: Regulatory mechanisms throughout the lifecycle of alternatives to DDT in place									
<i>Activity 1.1.1:</i> Establish an inter-ministerial working group to follow and guide the implementation of the project activities	200,000							10,000	
<i>Activity 1.1.2:</i> Identify the legal requirements at each stage of the lifecycle for the alternatives to DDT	300,000							20,000	
<i>Activity 1.1.3:</i> Identify gaps in the legal framework throughout the lifecycle for the alternatives to DDT	100,000							10,000	
<i>Activity 1.1.4:</i> Identify the potential for strengthening and streamlining the legal requirements at each of the stages of the lifecycle	250,000							10,000	
Output 1.2: Guidance documents for producers, registration holders and users on the legal requirements for alternatives to DDT developed									
<i>Activity 1.2.1:</i> Develop guidance document for producers, registration holders and users on the legal requirements for alternatives to DDT	200,000							30,000	
<i>Activity 1.2.2:</i> Testing by potential user of the guidance	150,000							28,000	
<i>Activity 1.2.3:</i> Finalize the guidance document	50,000							22,600	

Outcome/Output/Activities	MoEF (in-kind)	MoCF/HIL (cash/in-kind)	MoHW&F (in-kind)	NBRI (cash)	NBRI (in-kind)	UNIDO (cash)	UNIDO (in-kind)	UNEP (in-kind)	TOTAL
Outcome 2: Development and efficient pilot production of bio- and botanical pesticides as well as other alternatives to DDT ready for enhancement to large scale production									
Output 2.1: Existing Neem sheds scaled up for production of Neem-based botanical pesticides through PPP model									
<i>Activity 2.1.1:</i> Existing facilities scaled up for self surface spreading, cream, suspension concentrate and mosquito coil formulations		700,000		1,000,000	2,800,000				
<i>Activity 2.1.2:</i> Prepare design and layout for 10 pilot facilities		30,000			500,000				
<i>Activity 2.1.3:</i> Set up 10 pilot facilities under PPP				2,000,000	6,000,000				
<i>Activity 2.1.4:</i> Technology transfer					200,000	10,000			
<i>Activity 2.1.5:</i> Carry out technical training in producing neem extract and formulations	500,000	50,000			300,000				
Output 2.2: One (1) Bt- based bio-pesticides pilot production facility meeting international operational standard established in the government sector									
<i>Activity 2.2.1:</i> Cooperate with an internationally accepted institution in identification of indigenous strains for production	50,000	30,000					13,000		
<i>Activity 2.2.2:</i> Develop formulations using local strains suiting the agro-climatic zones for self surface spreading, suspension concentrate and wettable powder		250,000							
<i>Activity 2.2.3:</i> Liaise with international accepted institution to plan/ prepare a blueprint of 1 pilot facility	50,000	20,000					10,000		

Outcome/Output/Activities	MoEF (in-kind)	MoCF/HIL (cash/in-kind)	MoHW&F (in-kind)	NBRI (cash)	NBRI (in-kind)	UNIDO (cash)	UNIDO (in-kind)	UNEP (in-kind)	TOTAL
<i>Activity 2.2.4:</i> Set up one (1) pilot facility meeting international standards		2,000,000				10,000	15,000		
<i>Activity 2.2.5:</i> Develop a long-term cooperation with such an internationally accepted institution for specific technical training programs required	50,000	10,000							
Output 2.3: Domestic LLIN production potential scaled up and operational at one (1) site in the governmental sector									
<i>Activity 2.3.1:</i> Identify quality criteria for LLIN formulation and production		50,000		50,000					
<i>Activity 2.3.2:</i> Prepare the specifications and layout of pilot plants for active ingredient production and LLIN formulation		100,000		50,000					
<i>Activity 2.3.3:</i> Set up and make operational the above pilot plants		13,567,167				10,000			
<i>Activity 2.3.4:</i> Carry out technical training in LLIN production	500,000	150,000		500,000					
Output 2.4: Business model for alternatives developed, promoted and marketed									
<i>Activity 2.4.1:</i> Develop business model for LLIN including strategy for the environmentally sound and cost-effective “cradle to grave” mechanism for “end-of-life” LLINs		30,000	30,000						
<i>Activity 2.4.2:</i> Develop business model for neem based mosquito coil, larvicide (self-surface spreading and suspension concentrate) and mosquito repellent (cream)		30,000							
									2,316,667

Outcome/Output/Activities	MoEF (in-kind)	MoCF/HIL (cash/in-kind)	MoHW&F (in-kind)	NBRI (cash)	NBRI (in-kind)	UNIDO (cash)	UNIDO (in-kind)	UNEP (in-kind)	TOTAL
<i>Activity 2.5.3:</i> Develop business model for Bt-based pesticides and their formulations		30,000	20,000						
<i>Activity 2.5.4:</i> Awareness raising on the safety, socio-economic and acceptability of DDT alternatives	500,000	108,833	500,000		200,000				
Outcome 3: Promotion of new dwarf cultivars with early maturity and higher limonoids yield for large scale cultivation									
Output 3.1: New cultivars of neem with high yielding limonoids propagated using tissue culture technology and large scale clonal propagation									
<i>Activity 3.1.1:</i> Identify criteria for selection of four (4) sites for micro-propagating new cultivars					65,0000				
<i>Activity 3.1.2:</i> Prepare design and layout for 4 pilot facilities for tissue culture technology					41,667				
<i>Activity 3.1.3:</i> Set up 4 pilot facilities				500,000	1,700,000	10,000			
Outcome 4: Central and State Governments endorse implementation of Integrated Vector Pest Management (IVPM) policies / strategies									
Output 4.1: IVPM developed, promoted and pilot tested in selected sites									
<i>Activity 4.1.1:</i> Prepare specific training modules for promoting IVPM at local level	50,000		700,000					50,000	
<i>Activity 4.1.2:</i> Develop practical training courses for promoting IVPM in a train the trainers course	100,000		500,000					20,000	
<i>Activity 3.1.3:</i> Carry out pilot training (test the training materials and adapt where necessary)	400,000		800,000		200,000			25,400	
2,316,667									
2,316,667									
2,845,400									
2,845,400									

Outcome/Output/Activities	MoEF (in-kind)	MoCF/HIL (cash/in-kind)	MoHW&F (in-kind)	NBRI (cash)	NBRI (in-kind)	UNIDO (cash)	UNIDO (in-kind)	UNEP (in-kind)	TOTAL
Outcome 5: Monitoring of project interventions and evaluation of results									
Output 5.1: Technical reporting prepared and made available at each stage of the project									
<i>Activity 5.1.1:</i> Prepare inception report	2,000								
<i>Activity 5.1.2:</i> Carry out annual project financial audits, prepare Annual Project Reports and Project Implementation Reports	50,000							3,000	
<i>Activity 5.1.3:</i> Establish a project management information system to share and disseminate relevant data / information	50,000						30,000	1,000	
<i>Activity 5.1.4:</i> Prepare and Complete Terminal Report	20,000						5,000	2,000	
Output 5.2: Project implementation management and M&E mechanism									
<i>Activity 5.2.1:</i> Organize and hold inception workshop	10,000					3,000	5,000	3,000	
<i>Activity 5.2.2:</i> Augment National Steering Committee (NSC), establish Project Steering Committee (PSC) and National Project Coordination Unit (NPCU), recruit National Project Coordinator and other project staff	600,000	120,000	50,000						
<i>Activity 5.2.3:</i> Hold annual tripartite review / Project Steering Committee meetings	50,000	50,000	50,000			24,500	40,000	10,000	
									1,984,500
									163,000
									1,713,500

Outcome/Output/Activities	MoEF (in-kind)	MoCF/HIL (cash/in-kind)	MoHW&F (in-kind)	NBRI (cash)	NBRI (in-kind)	UNIDO (cash)	UNIDO (in-kind)	UNEP (in-kind)	TOTAL
<i>Activity 5.2.4:</i> Hold national technical working group meetings	200,000	50,000	30,000					10,000	
<i>Activity 5.2.5:</i> Carry out awareness raising campaign and hold final workshop to disseminate lessons learnt	200,000	100,000	70,000				35,000	3,000	
Output 5.3: Project evaluation									
<i>Activity 5.3.1:</i> Carry out independent Mid-term review	30,000						10,000	3,000	
<i>Activity 5.3.2:</i> Carry out final evaluation	50,000						10,000	5,000	
PMC	1,288,000						170,000	158,000	1,616,000
GRAND TOTAL	6,000,000	17,476,000	3,330,000	3,500,000	12,006,667	67,500	343,000	424,000	43,147,167

ANNEX F: PROJECT WORKPLAN

Outcome/Output/Activities	Y1				Y2				Y3				Y4				Y5			
	Q1	Q2	Q3	Q4																
Outcome 1: Efficient system for fulfilling legal requirements at the various stages of the lifecycle of alternatives to DDT																				
Output 1.1: Regulatory mechanisms throughout the lifecycle of alternatives to DDT in place																				
Activity 1.1.1: Establish an inter-ministerial working group to follow and guide the implementation of the project activities																				
Activity 1.1.2: Identify the legal requirements at each stage of the lifecycle for the alternatives to DDT																				
Activity 1.1.3: Identify gaps in the legal framework throughout the lifecycle for the alternatives to DDT																				
Activity 1.1.4: Identify the potential for strengthening and streamlining the legal requirements at each of the stages of the lifecycle																				
Output 1.2: Guidance documents for producers, registration holders and users on the legal requirements for alternatives to DDT developed																				
Activity 1.2.1: Develop guidance document for producers, registration holders and users on the legal requirements for alternatives to DDT																				
Activity 1.2.2: Testing by potential user of the guidance																				
Activity 1.2.3: Finalize the guidance document																				
Outcome 2: Development and efficient pilot production of bio- and botanical pesticides as well as other alternatives to DDT ready to further enhancement to large scale production																				
Output 2.1: Existing Neem sheds scaled up for production of Neem-based botanical pesticides through PPP model																				

Outcome/Output/Activities	Y1				Y2				Y3				Y4				Y5			
	Q1	Q2	Q3	Q4																
Activity 2.1.1: Existing facilities scaled up for self surface spreading, cream, suspension concentrate and mosquito coil formulations																				
Activity 2.1.2: Prepare design and layout for 10 pilot facilities																				
Activity 2.1.3: Set up 10 pilot facilities under PPP																				
Activity 2.1.4: Technology transfer																				
Activity 2.1.5: Carry out technical training in producing neem extract and formulations																				
Output 2.2: One (1) Bt- based bio-pesticides pilot production facility meeting international operational standard established in the governmental sector																				
Activity 2.2.1: Cooperate with an internationally accepted institution in identification of indigenous strains for production																				
Activity 2.2.2: Develop formulations using local strains suiting the agro-climatic zones for self surface spreading, suspension concentrate and wettable powder																				
Activity 2.2.3: Liaise with such an internationally accepted institution to plan and prepare a blueprint of one (1) pilot facility in India																				
Activity 2.2.4: Set up one (1) pilot facility meeting international standards																				
Activity 2.2.5: Develop a long-term cooperation with such an internationally accepted institution for specific technical training programs required																				
Output 2.3: Domestic LLIN production potential scaled up and operational at one (1) site in the governmental sector																				
Activity 2.3.1: Identify quality criteria for LLIN formulation and production																				

Outcome/Output/Activities	Y1	Y2	Y3	Y4	Y5
---------------------------	----	----	----	----	----

	Q1	Q2	Q3	Q4												
Activity 2.3.2: Prepare the specifications and layout of pilot plants for active ingredient production and LLIN formulation																
Activity 2.3.3: Set up and make operational the above pilot plants																
Activity 2.3.4: Carry out technical training in LLIN production																
Output 2.4: Business model for alternatives developed, promoted and marketed																
Activity 2.4.1: Develop business model for LLIN including strategy for the environmentally sound and cost-effective “cradle to grave” mechanism for “end-of-life” LLINs																
Activity 2.4.2: Develop business model for neem based mosquito coil, larvicide (self surface spreading and suspension concentrate) and mosquito repellent (cream)																
Activity 2.5.3: Develop business model for Bt-based pesticides and their formulations																
Activity 2.5.4: Awareness raising on the safety, socio-economic and acceptability of DDT alternatives																
Outcome 3: Promotion of new dwarf cultivars with early maturity and higher limonoids yield																
Output 3.1: New cultivars of neem with high yielding limonoids propagated using tissue culture technology and large scale clonal propagation																
Activity 3.1.1: Identify criteria for selection of four (4) sites for micro-propagating new cultivars																
Activity 3.1.2: Prepare design and layout for 4 pilot facilities for tissue culture technology																
Activity 3.1.3: Set up 4 pilot facilities																

Outcome/Output/Activities	Y1	Y2	Y3	Y4	Y5

	Q1	Q2	Q3	Q4												
Outcome 4: Central and State Governments endorse Integrated Vector Pest Management (IVPM) policies / strategies																
Output 4.1: IVPM developed, promoted and pilot tested in selected sites																
Activity 4.1.1: Prepare specific training modules for promoting IVPM at local level																
Activity 4.1.2: Develop practical training courses for promoting IVPM in a train the trainers course																
Activity 3.1.3: Carry out pilot training (test the training materials and adapt where necessary)																
Outcome 5: Monitoring of project interventions and evaluation of results																
Output 5.1: Technical reporting prepared and made available at each stage of the project																
Activity 5.1.1: Prepare inception report																
Activity 5.1.2: Carry out annual project financial audits, prepare Annual Project Reports and Project Implementation Reports																
Activity 5.1.3: Establish a project management information system to share and disseminate relevant data / information																
Activity 5.1.4: Prepare and Complete Terminal Report																
Output 5.2: Project implementation management and M&E mechanism																
Activity 5.2.1: Organize and hold inception workshop																

Outcome/Output/Activities	Y1				Y2				Y3				Y4				Y5			
	Q1	Q2	Q3	Q4																
Activity 5.2.2: Augment National Steering Committee (NSC), establish Project Steering Committee (PSC) and National Project Coordination Unit (NPCU), recruit National Project Coordinator and other project staff																				
Activity 5.2.3: Hold annual tripartite review / Project Steering Committee meetings																				
Activity 5.2.4: Hold national technical working group meetings																				
Activity 5.2.5: Carry out awareness raising campaign and hold final workshop to disseminate lessons learnt																				
Output 5.3: Project evaluation																				
Activity 5.3.1: Carry out independent Mid-term review																				
Activity 5.3.2: Carry out final evaluation																				

ANNEX F: BACKGROUND INFORMATION AND OVERVIEW OF BASELINE SITUATION IN INDIA

Regulatory Context

India has strong legislation and enforcement of DDT issue covered by the Insecticides Act 1968 & Rule 1971 under the Ministry of Agriculture. The use of DDT in agriculture has been banned in 1989 in India. DDT is exclusively used in NVBDCP only as per WHO Guidelines, under the strict supervision of Government. The quantity of DDT for use in public health is decided every year by a Mandate group under Chairmanship of Union Secretary of Health & Family Welfare.

The legislative framework for production, registration, use and disposal of chemicals including biopesticide, botanical pesticide and LLIN in India is scattered between a number of Acts, Rules and Regulations, such as Rules on manufacturing, storage and import of hazardous chemicals; Rules on chemicals accidents, Insecticides act and rules; public liability insurance act, etc. The legal system means that there are many competent authorities with very limited coordination. The enforcement of legislation is patchy, especially with the very many small and medium sized enterprises. There is State level responsibilities, but only with limited capacity and knowledge. India has in 2012 released a draft national chemicals policy where the need for consolidation of Acts and rules has been recognized. The need for a holistic approach towards chemicals legislation together with the consolidation into one coherent and comprehensive piece of legislation is recommended.

Insecticides Act & Rule

Insecticides Act 1968 is meant to regulate the import, manufactures sale, transport, distribution and use of insecticides with a view to prevent risk to human beings or animals, and for matters connected therewith. It extends to the whole of India. The Central Government has constituted a Board, called as the Central Insecticides Board to advise the Central Government and State Governments on technical matters arising out of administration of this Act and to carry out the other functions assigned to the Board by or under this Act. The Board consists of 25 members. The Board may, subject to the previous approval of the Central government, make bye-laws for the purpose of regulating its own procedure and the procedure of any committee thereof and the conduct of all business to be transacted by it or such committee. The Central Government constitutes a Registration Committee to register insecticides after scrutinizing their formulae and verifying claims made by the manufacturer. As per Insecticides Act 1968 & Rules 1971, no pesticides are allowed to produce, use, export & import without registration by the Insecticides Board. Long lasting insecticidal mosquito net (LLIN) is an insecticide base formulation comes under ambit Insecticide Act, 1968. For manufacturing, use & export of LLIN, it require Central Insecticide Board registration as per laid down guidelines.

Registration of insecticides

Any person desiring to import or manufacture any insecticide may apply to the Registration Committee for the registration of such insecticide. Every application shall be made in such form and contain such particulars as may be prescribed. On receipt of any such application Registration Committee will scrutinize it as per laid down guideline. Registration is done under three different categories- 9(3B) Interim registrations, 9(3) Full registration, 9(4) Me- Too registration

Guidelines for registration of long lasting insecticidal mosquito net (LLIN) for registration under the Insecticide Act, 1968

According to World Health Organization Pesticide Evaluation Scheme (WHOPES) a LLIN should maintain bioefficacy for more than or equal to 95% knockdown and/or 80% mortality against targeted mosquitoes species for at least 20 serial washings in laboratory and 3 years of continuous use in the field conditions (WHO 2005). The benchmark of WHOPES is globally accepted.

Three years bio-efficacy trial in three locations in endemic areas. The bio efficacy trial has to be conducted by adopting the protocol devised by the Indian Council of Medical Research. Baseline data on persistence of insecticides on the net and its analysis for comparison on yearly basis, Sustainability of fabrics, Toxicological data for long lasting insecticidal mosquito bed nets. Full package of toxicological data of the pesticide, if the pesticide used is not already registered. The data/information shall be used for risk assessment as per WHO

guidelines. Other data/information, as required in Chemistry and Packaging as per Central Insecticide Board & Registration committee guideline.

Guidelines/data requirements for registration of Entomotoxic bacteria technical and formulation under the Insecticide Act, 1968

Registration data/information like biological characteristics & chemistry like physical specification, Delta endotoxin content, other impurities, test procedure and criteria used for identification, Immunology assays, Potency of product, shelf life etc are required. Bio efficacy data like data on bio-effectiveness, data on effect on non-target organisms, Full package of toxicological data of the pesticide, data/information as required in Packaging as per Central Insecticide Board & Registration committee guideline.

Guidelines/data requirements for registration of Neem based products containing Azadirachtin under the Insecticide Act, 1968

Bio efficacy data like data on bio-effectiveness, data on effect non-target organisms, toxicological data of the pesticide, data/information as required in Chemistry and Packaging.

National Standard of Long-Lasting Insecticidal Net

Long Lasting Insecticidal Net (LLIN) is a factory-treated mosquito net made with netting material that has insecticide incorporated within or bound around the fibres. The net must retain its effective biological activity without re-treatment for at least 20 WHO standard washes under laboratory conditions and three years of recommended use under field conditions as defined in WHO guidelines. The number of washes providing mortality and/or KD above the cut-off point (more than 80% mortality after 24 hours and/or above 95% KD after 60 minutes post-exposure) after 3 minutes exposure. Based on WHO specified standard specification, national standard for LLIN is already established in India. Outlines of national standard of LLIN is here under.

1. Description -The product shall be formed from netting, consisting of denier/decitex, mono-/poly-filament, polymer type] fibers, treated with technical/formulated complying with WHO specification together with any necessary stabilizers, plasticizers, synergist, if required.
2. Active ingredients -The active ingredient shall comply with an identity test. The content shall be declared and, when determined, the average content shall not differ from that declared content with tolerance limit.
3. Release or retention index of active ingredient -The release or retention index of the active ingredient from the netting, shall be within the prescribed limit.
4. Total content of synergist -The content of synergist shall be declared when determined; the average content shall not differ from that declared limit.
5. Physical properties
 - Netting mesh size- The netting shall have a minimum of complete holes per cm².
 - Dimensional stability of netting to washing- Dimensional stability: not exceeding $\pm 5\%$ of the initial dimension.
 - Mass per m² The mass/m² shall be declared and, when determined, shall not differ from that declared mass by more than $\pm 10\%$.
 - Bursting strength - Minimum bursting strength to be declared.
 - Tearing strength -Minimum tearing strength to be declared.
6. Storage stability
 - Stability at elevated temperature - After storage at $54 \pm 2^\circ\text{C}$ for 2 weeks, the determined total active ingredient content shall not be lower than the prescribed limit, and the determined total synergist content shall not be lower than the prescribed limit, relative to the determined average content found before storage and the product shall continue to comply with the clauses for: - initial surface concentration, release or retention index, dimensional stability, bursting strength, tearing strength.

WHOPES sponsored several field trials on LLINs in India including the following:

Interceptor: Interceptor® is a polyester, multifilament net treated with a target dose of 6.7 g/kg or 200 mg/m² of FENDOZIN, a mixture of alpha-cypermethrin and a polymer binder applied at the production facility. Interceptor LLIN received WHOPES full recommendation for use in malaria prevention and control in 2012. To get the full recommendation an LLIN product has to undergo Phase III testing as per the guidelines of WHOPES. To evaluate the durability up to 3 years of use by community to provide effective protection against malaria, a large-scale household randomized trial of Interceptor LLIN was conducted at two sites in India (Gujarat and Chhattisgarh States) during 2008-2011 as referred in Sharma, S.K. et al. (2005, 2006 a, 2006 b, 2009 a, 2009 b, 2010)

Bio-assays at the baseline on LLINs and insecticide treated nets (ITNs) met with the WHO criteria of >95% knockdown or > 80% mortality. The overall results revealed that proportion of LLINs meeting the WHO criteria of bio-assay efficacy was well above the cut off. It could be concluded that Interceptor LLINs showed high efficacy and holds a strong promise to be used as a malaria vector control tool in the Indian national malaria control programme as it has shown an effective life of three years of use under the field conditions prevailing in the two states.

DuraNet: DuraNet® is a new long lasting insecticidal net incorporated with alpha-cypermethrin @ 5.8 g/kg a.i into high density polyethylene monofilament fibres. The WHOPES reviewed results of Phase II evaluation of DuraNet and has recommended to further confirm DuraNet's long-lasting efficacy, longevity and fabric integrity as well as community acceptability, as a requirement for developing full recommendations on the use of the product. Therefore, a phase III evaluation of DuraNet® LLINs in comparison with polyester nets treated with alphacypermethrin at 40 mg/m² a.i. was conducted in a malaria hyperendemic area of Sundargarh District, Orissa, India during 2009-2012.

The trial results showed that DuraNet LLINs maintained high efficacy against malaria vector for a period of three years under field conditions and can be used as a malaria control intervention tool in the community based malaria control programme.

Acceptability of LLINs by the community

The surveys revealed Interceptor LLIN use rate of >66% by all household members year-round and every night in Chhattisgarh state whereas it varied from 36.7% to 96.6% in Gujarat state during different seasons mainly depending upon the perceived nuisance of biting mosquitoes.

In DuraNet trial, the percentage of nets found after one month of distribution was 100% and it was maintained even after 36 months of community use. Surveys after 12, 24 and 36 months covering all the households revealed year round and every night net usage rate of 78.0, 55.6 and 61.7% respectively indicating significant acceptance of nets by the study population. None of the distributed nets was found missing in all the surveys, thereby indicating full survivorship rate over a period of three years. The net usage rate also depended on mosquito nuisance during certain months but every night use of net remained > 53% (range 53.3-95.4%).

Washing frequency and behaviour

No fixed interval of time was followed in net washing as observed during Interceptor LLIN trial. The net washing done at 4-month intervals constituted the highest percentage of 29.4%. The tendency of washing was higher in Chhattisgarh as compared to Gujarat. A particular community washed the nets more frequently as compared to other ethnic groups. Use of local soap powders for washing was higher as compared to soap bar or mix of soap and powder.

During DuraNet trial, majority of the households (60%) washed their nets at six monthly intervals and a small proportion (6.7%) washed their nets at about monthly intervals. The proportion of washed LLINs ranged from 83% to 95% after 18 to 36 months of net distribution. All the households used locally available detergent powder and cold water was used for washing the nets and 93.3% of them dried their nets outdoors under shade.

Physical aspect of LLINs

The percentage of ITNs with holes was 33.3% and 53.3% in Chhattisgarh and Gujarat sites respectively after one-year of distribution. The proportion of LLINs with holes increased with increase in period of use. This was evident from increase in mean hole index from 33.6 after 6 month to 377.8 after 36 months at Gujarat and from 7.3 to 116.4 at Chhattisgarh study sites. Attrition rate in Gujarat was 0.95, 3.3% and 0.4% and in Chhattisgarh it was 3.1%, 8.4% and 20.2% respectively after 12, 24 and 36 months of household use.

In Orissa, the proportion of nets with holes after one year was 26.7%, which gradually increased to 43.3% and 74% after two and three years of net distribution respectively. The most significant increase was observed in holes of size-1 from 0.7 holes per net after six months to 6.7 holes per net after three years of net use. Most of the holes were on the lower half of the nets than on upper half or the roof during all the surveys. Based on the holes of different sizes, mean hole index was calculated. The mean hole index increased from 2.4 after six months to 92.9 after three years.

The percentage of clean nets, a bit dirty, dirty and very dirty varied from 3.3% to 33.3% 13.3% to 33.3%, 13.3% to 46.7% and 16.7% to 43.3% during the surveys carried out after every 6 months up to 3 years respectively in Gujarat. The above percentage varied from 0 to 46.7%, 6.7% to 43.3%, 16.7% to 76.7% and 3.3% to 16.7% respectively in Chhattisgarh during the same period. In Orissa, the proportion of clean nets varied from 6.7% to 26.7% whereas that of very dirty nets was 3.3% to 26% during surveys undertaken after every six months up to three years of household use of nets.

In Gujarat, quite a few LLINs were found with repairs in the form of stitches (0.6-1.6 per net) and knots (0.5-1.0 per net), open seams (1.7/net) and none with patches and due to fire at different intervals. In Chhattisgarh, LLINs were found with stitches (0.3-2.2 per net) and knots (0.2- 1.0 per net), open seams (0.05-0.3) and none with patches. Hole due to fire was recorded in one net each in survey carried out after 18 and 30 months. In Orissa, only few nets were found with repairs in the form of stitches (0.07 – 0.38 per net) and knots (0.03 – 0.34), open seams (0.02/net) and none with patches. Holes due to fire ranged between 0.07 – 0.4/net during different intervals.

Chemical residual analysis of used LLINs

The alpha-cypermethrin a.i. on ITNs, mean content at the baseline in samples drawn from Gujarat and Chhattisgarh was 30.5 and 43.9 mg/m² respectively which declined to 14.5 and 12.6 mg/m² respectively after one year of household use. The decline in alpha-cypermethrin a.i. content was -71.3% and -52.5% in ITN samples from Chhattisgarh and Gujarat respectively. Mean alpha-cypermethrin a.i. content in LLINs sampled at baseline was 270.9 mg/m² which was more than the dose of 200 mg/m² as per the WHO specifications of Interceptor LLINs. Mean alpha-cypermethrin a.i. content in LLINs sampled after 3 years of household use was 53.3 mg/m² which was more than 40 mg/m² dose recommended by WHO for conventional treatment of nets.

In DuraNet trial, there was 75% loss of insecticide over a period of one year in conventionally treated nets (ITNs). Chemical analysis of DuraNet LLINs at baseline showed that mean ACM a.i. content was 249.3 mg/m², which was just near to the labelled dose of 250 mg/m². There was a reduction of 47.5% alpha-cypermethrin after three years. The mean concentration of ACM a.i. available on DuraNet LLIN after three years of household use was 158.7 mg/m², which was more than the WHOPES recommended dose of 40 mg/m² for conventional treatment of nets.

Waste management issues with LLINs

As LLINs are treated with insecticide and maintain at their end of life a significant amount of their initial charge, the issue of proper waste management of LLINs is significant. Current disposal practices in India are not well characterized, but (as an indication) practices in sub-Saharan African countries are typically ad hoc at the local, district or national level, with the result that the great majority of used LLINs are reused for (unapproved) alternative uses or simply being disposed of in the environment in an uncontrolled manner.

ANNEX G: SCIENTIFIC EVIDENCE OF NEEM BASED PESTICIDES

The insecticidal activities of the Neem tree have been known for many years. Neem fruit, bark, leaves and seeds have been used for various purposes against agricultural and household insects due to their insecticidal activities. Neem seed kernel extract and Neem seed kernel oil are formulated in various ways and are the most commonly commercially-available Neem insecticides for control of agricultural pests. For control of mosquitoes, a variety of Neem-based insecticides ranging from crude extracts to sophisticated formulations have been investigated. Although laboratory studies are vital for understanding how Neem products and formulations affect mosquitoes, it is the results of field studies that determine their potential for real situations.

The formulation of a Neem product that is used against mosquitoes depend on whether it is the larvae or the adults being targeted.

Neem formulations for control of mosquito larvae

These are formulations applied to the aquatic breeding habitat of mosquitoes. These formulations are typically called larvicides but in addition to killing larvae often affect other immature stages, as well as deter oviposition by females. They are based on four types of Neem extracts each with different methods of application:

Neem seed kernel extract,
Neem seed kernel oil, commonly called Neem oil
Neem seed cake, commonly called Neem cake
Neem leaf extract.

The Institute of Pesticide Formulation Technology (IPFT) has patented a product with botanical composition for the preparation of mosquito repellent coil using neem kernel powder as the active ingredient and *kabuli keekar* (*prosopis juliflora*) as synergist. This neem based coil has good knock down property of mosquitoes. The patent was filed by the Institute on 18-2-2010 and has been accepted for publication.

Of these extracts, Neem oil has been tested several times against mosquitoes in the field with promising results (Table 1). Neem oil emulsions when applied at rates of 250 ml Neem oil / 100 m² of water surface to mosquito breeding sites reduced populations of malaria vectors, i.e., *Anopheles* spp., by 100% in the first 1-2 weeks after application. However, these emulsions were not as efficacious towards populations of the lymphatic filariasis vector, *Culex quinquefasciatus*, although substantial reductions in larval numbers occurred within the first week of application. Combination of neem oil and karranja seed oil has been found effective against mosquito larvae of *A. aegypti*. (Megha Pant, et. al. 2012).

Investigations of the effects of Neem seed kernel extract, Neem seed cake and Neem leaf extract on mosquitoes have been done by several workers (Akinnibosun 2009; Kudom et al. 2011; Kumar et al. 2011; Nicoletti et al. 2010, 2012). IPFT has also filed an application for patent of neem with kabuli kikar extract using aqueous extract of neem against the *Aedes aegypti* and has been accepted for publication.

EC formulation of neem (Nico neem) has been tested and found effective against larvae of *Anopheles stephensi* and *Aedes aegypti*. (Shivakumar and Kataria, 2011). Hebbalkar et. Al. 2006 compared the bio efficacy of commercial neem formulation vis. Neemazal (1%), Neemicide (0.03%), Neemarin (0.15%), and Nimbicidine (0.03%) against larvae of *Aedes aegypti* and *Culex quinquefasciatus*.

Table 1. Effects on mosquito vector populations of breeding sites of a single Neem application. Results for malarial vectors are in bold type

Country	Species	Extract	Aza content	Formulation / Product	Application rate	Stage	% reduction in population density ¹ at different times after application					Reference
							1 day	1 week	2 weeks	3 weeks	4 weeks	
Egypt	<i>Anopheles</i>	Neem oil	1570 ppm	2.5% Neem oil-water emulsion	250 ml Neem oil / 100 m ²	Larvae	100	100	100		40.4	Awad & Shimaila 2003
					500 ml Neem oil / 100 m ²	Larvae			89.9		71.9	
India	<i>Anopheles stephensi</i>	Neem oil		5% Neem oil-water emulsion	250 ml Neem oil / 100 m ² in pools	Larvae III & IV	100	100	22			Batra et al. 1998
					500 ml Neem oil / 100 m ² in tanks	Larvae III & IV	100	100	100			
	250 ml Neem oil / 100 m ² in pools				Larvae III & IV	51.6	65.1	91.2				
	250 ml Neem oil / 100 m ² in drains				Larvae III & IV	90.4	19.2	24.8				
India	<i>Culex quinquefasciatus</i> <i>Anopheles Aedes</i>	Neem oil	0.15% w/v	emulsified Neem oil concentrate	5 l formulation / 53 m ² surface area	Larvae	95.5	89.9	85.7	79.7		Dua et al 2009
						Larvae	98.1	100	90.4	83.8		
						Larvae	95.1	100				
India	<i>Anopheles stephensi</i> & <i>Aedes aegypti</i>	Neem oil		Balls made from wood scrapings soaked in Neem oil in acetone	2 balls soaked in 5% Neem oil	Larvae Pupae	85.3 100	88.4 100	100 100	81.3 100	77.6 100	Nagpal et al. 1995

¹ % Reduction in population density calculated using Mulla's formula (Mulla 1971), % reduction = 100 - C1/T1 x T2/C2 x 100, where C1 = population density of control sites before treatment, T1 = population density of treatment sites before treatment, C2 = population density of control sites after treatment, and T2 = population density of treatment sites after treatment.

Neem formulations for control of mosquito adults

1. Repellent for formulations applied to human skin or clothing

These formulations act by repelling mosquitoes and thereby reducing mosquito bite rate. Neem oil is the Neem extract most frequently used in repellent formulations. Neem oil creams and lotions show good repellent activity against many mosquito species (Table 2), although repellent action is often maintained for only a few hours. Malaria vectors (*Anopheles* spp.) appear to be the most sensitive to Neem-based personal repellents with protection levels greater than 80% being maintained for more than 9 hours in one study (Dua et. 1995). High rates of repellence also occur for *Culex* and *Aedes* species, although the duration of protection is usually less than that for *Anopheles* spp.

Table 2. Repellent effects of Neem formulations applied to human skin. Results for malarial vectors are in bold type; L – Landing mosquitoes; B – Biting mosquitoes

Country	Formulation	Species	Overall % Protection	Maintenance of protection		Reference
				Protection level	Duration (hours)	
India	5% Neem oil in vanishing cream base	<i>Aedes albopictus</i>	78 L			Dua et al. 1995
		<i>Aedes aegypti</i>	84 L			
		<i>Aedes spp.</i>	78 L	100% L ≥80% L ≥60% L	0 2 4	
		<i>Anopheles spp.</i>	95 L	100% L ≥80% L ≥60% L	2 ≥9 ≥9	
		<i>Culex quinquefasciatus</i>	90 L	100% L ≥80% L ≥60% L	0 ≥9 ≥10	
Ethiopia	27.8% Neem oil (hexane-extracted) in coconut oil	mosquitoes	87 B			Hadis et al. 2003
India	2% Neem oil in coconut oil	<i>Anopheles culicifacies</i>	98 B			Kant & Bhatt 1994
		<i>Anopheles fluviatilis</i>	89 B			
		<i>Culex quinquefasciatus</i>	76 B			
		<i>Culex vishnui gr.</i>	80 B			
		<i>Aedes taeniorhynchoides</i>	86 B			
		<i>Mansonia uniformis</i>	87 B			
India	50% Neem oil in coconut oil	<i>Culex quinquefasciatus</i>	90 L	100% L	3	Mandal 2011
India	4% Neem oil in coconut oil	<i>Anopheles culicifacies</i>	89 L	100% L	7	Mishra et al. 1995
Bolivia	2% Neem oil in alcohol (Riddance Bur Repellent)	mosquitoes		57% L	4	Moore et al. 2002
India	2% Neem oil in	<i>Culex</i>	50 L			Ravindran

	coconut oil	<i>quinquefasciatus</i>				et al. 2002
India	2% Neem oil in coconut oil	<i>Aedes</i> spp. <i>Armigeres</i> spp. <i>Culex quinquefasciatus</i>	85 L 38 L 61 L			Sharma et al. 1995
India	2% Neem oil in coconut oil	<i>Anopheles culicifacies</i>	100 B			Sharma et al. 1993
India	5% Neem oil in vanishing cream base	<i>Anopheles culicifacies</i>	95 L	100% L	1	Singh et al 1996

2. Formulations that release Neem volatiles into the adult mosquito aerial space near to humans

These formulations act by repelling mosquitoes from the space around humans and some may have knockdown mortality effects as well (Jantan et al. 1999; Zaridah et al. 2006). Several methods used for release of Neem volatiles have been investigated (Table 3). They include:

- a. Neem leaves
 - Fresh leaves smouldered or heated
 - Fresh leaves crushed and extracted in water and the resulting solution vaporised
 - Dried powdered leaves formulated with other ingredients in mosquito coils and burnt
- b. Potted whole plants – volatiles released from undamaged and bruised leaves
- c. Neem oil
 - Burnt in kerosene
 - Vaporised in acetone

Neem leaves, smouldered or heated, and potted Neem plants hanging in rooms generally had low efficacy against adult mosquitoes (Table 2.3). Neem oil diluted in kerosene and burnt in kerosene lamps had good efficacy, especially against malarial mosquitoes with a 95% reduction in *Anopheles* landing on human baits in treated rooms. Neem oil vaporised in acetone also had good efficacy with a 98% reduction in numbers of *Anopheles* caught in treated rooms. Dried powdered Neem leaves burnt in mosquito coils also had high efficacy and, again, especially against *Anopheles* spp. (98% reduction in resting mosquitoes in treated rooms).

3. Neem formulations applied to bednets

Mosquitoes that are attracted by humans under nets receive toxic doses of active ingredient when they alight on the nets. Mosquitoes may also be repelled by Neem-based products applied to bednets. Research on bednets impregnated with Neem extract to control biting mosquitoes has begun relatively recently. Adekanmi & Abdulazeez (2013) soaked polyester net in a 10% Neem oil solution and determined a repellence rate of 88% for *Anopheles* adults. The experiment was limited by only having 1 replicate. A second, more comprehensive experiment was performed by Shivakumar et al. (2010) to determine mortality effects of Neem-impregnated nets on adult mosquitoes. They determined LC50 and LC99 values, respectively, of 77 and 462 ppm azadirachtin for *Culex quinquefasciatus* and 47 and 324 ppm azadirachtin for *Aedes aegypti*. In both studies, the sex of the adult mosquitoes used in experiments was not determined. Yet it is only the female that is important in terms of biting humans and transmitting disease. In addition, in both studies, no bait was used to attract mosquitoes to the net. Both female mosquitoes and the presence of baits are of major importance for determining utility of insecticide-treated nets. These laboratory studies therefore need to be followed up with further research, including field-based studies with human baits before an assessment of the efficacy of Neem-impregnated bednets can be made.

Neem formulations and synergists

From the above, the insecticidal activities of Neem-based products like creams, aqueous extracts, smoke coils, etc, vary depending on the mosquito species and other factors. There is therefore a need to develop formulations that can enhance the activity of Neem as a pesticide. One way to do this is to include a synergistic substance in the Neem formulation. Several trials of botanicals with synergists have been conducted against mosquitoes (reviewed by Shaalan et al. 2005). Synergists used in such trials were usually synthetic insecticides. Such formulations of plant extracts mixed with synthetic pesticides are not “Botanicals”. Natural synergists are therefore needed.

Recently, researchers at the Institute of Pesticide Formulation Technology identified a natural synergist that enhanced the insecticidal activity of neem seed extract. The pods of the kabuli keekar plant, *Prosopis juliflora*, do not have any insecticidal activity of their own, but do enhance the pesticidal activity of Neem. When an extract of *P. juliflora* pods was used in different concentrations in a composition containing neem seed extract as the other constituent, the resulting combination showed a remarkable synergistic effect against mosquito larvae. In one experiment, mosquito larval mortality produced by pure Neem kernel powder solution was only 40% and that of the pure synergist solution was much less at only 15%, which was similar to the control. However, when Neem kernel powder and synergist were combined in a 1:1 ratio, mortality was 70%, which was much higher than the sum total of individual larval mortalities produced by the Neem kernel powder and synergist alone. Similarly, synergism also occurred between Neem kernel powder and *P. juliflora* extract when applied against the vegetable pest, *Plutella xylostella*. *Prosopis juliflora* pod powder has also been shown to enhance considerably the mosquito repellent effects of mosquito coils that use Neem seed powder as the active principal. An 83.5% reduction in landing rate on human baits was achieved, which is as good as that achieved by commercial mosquito coils. IPFT has now filed to patent this synergistic formulation.

Table 3. Repellent effects on mosquito vectors of neem treatments applied to aerial spaces occupied by humans. Results for malarial vectors are in bold type. L – Mosquitoes landing on human baits; B – Mosquitoes biting human baits; R – Mosquitoes resting on room surfaces.

Country	Plant product, application method	Species	% Protection	Reference
Kenya	Neem leaves, fresh, heated above charcoal	<i>Anopheles gambiae</i> s.s.	25 L	Seyoum, Pålsson et al 2002
Kenya	Neem leaves, fresh, smouldered on charcoal	<i>Anopheles gambiae</i> s.s.	0 L	Seyoum, Pålsson et al 2002
Guinea Bissau	Neem leaves, fresh, smouldered on charcoal	mosquitoes	76 L	Pålsson & Jaenson 1999
Thailand	Neem leaves, 25% dried powder burnt in mosquito coil	<i>Culex gelidus</i> <i>Culex vishnui</i> <i>Culex quinquefasciatus</i> <i>Culex tritaeniorhynchus</i> <i>Mansonia uniformis</i> <i>Mansonia annulifera</i> <i>Mansonia indiana</i> <i>Anopheles subalatus</i> <i>Anopheles barbirostris</i> <i>Anopheles sudaicus</i> <i>Anopheles vagus</i> <i>Aedes aegypti</i>	78 L 88 L 85 L 82 L 93 L 96 L 95 L 100 L 100 L 100 L 100 L 100 L	Tawatsin et al. 2009
Kenya	Neem plants, pots hung in room	<i>Anopheles gambiae</i> s.s.	0 L	Seyoum, Kabiru et al. 2002

India	Neem oil, 1% in kerosene burnt in kerosene lamp	<i>Anopheles culicifacies</i> Total Anophelines <i>Culex</i>	66 R 95 B 70 B	Ansari & Razdan 1996
India	Neem oil, 2% in kerosene burnt in kerosene lamp	<i>Anopheles culicifacies</i> Total Anophelines <i>Culex</i> spp.	99 R 98 R 87 R	Sharma & Ansari 1994
	Neem oil, 1% in kerosene burnt in kerosene lamp	<i>Anopheles culicifacies</i> Total Anophelines <i>Culex</i> spp.	100 B 100 B 79 B	
India	Neem oil, 5% in acetone vaporised in vaporiser mat	<i>Culex quinquefasciatus</i> <i>Anopheles</i> spp.	82 L 63 R 98 R	Sharma et al. 1993

Conclusions

Formulations based on Neem, especially Neem oil, have proven efficacious against mosquitoes. *Anopheles* species, which are the mosquito vectors of malaria, are very sensitive to Neem-based insecticides, showing much higher mortality and repellence to these insecticides than do *Culex* species. Neem oil has been tested in the field with good results. However, Neem seed kernel extract, although extensively tested and now commercially developed for use against agricultural insects, has not been much investigated for control of mosquitoes, despite promising results in the laboratory (e.g., Kondo et al. 2004; Wandscheer et al. 2004; Shamia et al. 2006; Kumar et al. 2011). Neem formulations, such as mosquito larvicidal and coil formulations, which include the natural synergist, *P. juliflora* pod extract discovered by IPFT researchers, show great promise for use against mosquitoes and should be ready for testing in a pilot project.

ANNEX H: ECONOMIC DAMAGE CAUSED BY MALARIA

MAGNITUDE OF THE PROBLEM

Malaria is a public health problem in several parts of the country. About 95% population in the country resides in malaria endemic areas and 80% of malaria reported in the country is confined to areas consisting 20% of population residing in tribal, hilly, difficult and inaccessible areas. Directorate of National Vector Borne Disease Control Programme (NVBDCP) has framed technical guidelines/ policies and provides most of the resources for the programme. Indicators have been developed at national level for monitoring of the programme and there is uniformity in collection, compilation and onward submissions of data. Passive surveillance of malaria is carried out by PHCs, Malaria Clinics, CHCs and other secondary and tertiary level health institutions that patients visit for treatment. Apart from that, ASHA- a village volunteer is involved in the programme to provide diagnostic and treatment services at the village level as a part of introduction of intervention like Rapid Diagnostic Tests and use of Artemisinin Combination Therapy (ACT) for the treatment of Pf cases.

The country wide malaria situation as reflected in surveillance data from 1995-2010 is given in the following Table 1 below.

Table 1: Countrywide Epidemiological Situation (1995 – 2012)

Year	Population (in '000)	Total Malaria Cases (million)	P.falciparum cases (million)	Pf %	API	Deaths due to malaria
1995	888143	2.93	1.14	38.84	3.29	1151
1996	872906	3.04	1.18	38.86	3.48	1010
1997	884719	2.66	1.01	37.87	3.01	879
1998	910884	2.22	1.03	46.35	2.44	664
1999	948656	2.28	1.14	49.96	2.41	1048
2000	970275	2.03	1.05	51.54	2.09	932
2001	984579	2.09	1.01	48.20	2.12	1005
2002	1013942	1.84	0.90	48.74	1.82	973
2003	1027157	1.87	0.86	45.85	1.82	1006
2004	1040939	1.92	0.89	46.47	1.84	949
2005	1082882	1.82	0.81	44.32	1.68	963
2006	1072713	1.79	0.84	47.08	1.66	1707
2007	1087582	1.51	0.74	49.11	1.39	1311
2008	1119624	1.53	0.77	50.81	1.36	1055
2009	1150113	1.56	0.84	53.72	1.36	1144
2010	1167360	1.60	0.83	52.12	1.37	1018
2011	1194901	1.31	0.67	50.74	1.10	754
2012(Prov.)	1211509	1.06	0.53	50.01	0.88	519

The case load, though steady around 2 million cases annually in the late nineties, has shown a declining trend since 2002. When interpreting API, it is important to evaluate the level of surveillance activity indicated by the annual blood examination rate. At low levels of surveillance, the Slide Positivity Rate (SPR) may be a better indicator. The SPR (not shown in table) has also shown gradual decline from 3.50 in 1995 to 0.98 in 2012. The reported Pf cases declined from 1.14 million in 1995 to 0.53 million cases in 2012. However, the Pf % has gradually increased from 39% in 1995 to 50.01% in 2012. Number of reported deaths has been levelling around 1000 per year. The mortality peak in 2006 was related to severe malaria epidemics affecting Assam caused by population movements.

Country Scenario of Epidemiological Indicators for Malaria

The data in following Table 2 shows that Annual Parasite Incidence (API) rate has consistently come down from 2.12 per thousand in 2001 to 0.88 per thousand in 2012 but confirmed deaths due to malaria have been fluctuating during this period between 1707 and 519. The table below shows the information on indicators by which malaria prevention/ control activity in India are monitored and evaluated. Slide Positivity Rate (SPR) and Slide falciparum Rate (SfR) have reduced over the years 2001-2012. It is also observed that ABER has remained within 9.95% to 8.73 % during the period 2001 to 2012.

Table 2: Epidemiological Indicators for Malaria in India (2001-12)

Year	Population in thousand	Blood Smear Examined	Positive cases	Pf Cases	ABER	API	SPR	SFR	Deaths
2001	984,579	90,389,019	2,085,484	1,005,236	9.18	2.12	2.31	1.11	1,005
2002	1,013,942	91,617,725	1,841,229	897,446	9.04	1.82	2.01	0.98	973
2003	1,027,157	99,136,143	1,869,403	857,101	9.65	1.82	1.89	0.86	1,006
2004	1,040,939	97,111,526	1,915,363	890,152	9.33	1.84	1.97	0.92	949
2005	1,082,882	104,143,806	1,816,569	805,077	9.62	1.68	1.74	0.77	963
2006	1,072,713	106,725,851	1,785,129	840,360	9.95	1.66	1.67	0.79	1,707
2007	1,087,582	94,928,090	1,508,927	741,076	8.73	1.39	1.59	0.78	1,311
2008	1,119,624	97,316,158	1,526,210	775,523	8.69	1.36	1.57	0.80	1,055
2009	1,150,113	103,396,076	1,563,574	839,877	8.99	1.36	1.51	0.81	1,144
2010	1,167,360	106,040,223	1,495,817	779,549	9.21	1.37	1.41	0.74	1,018
2011	1,194,901	109,313,294	1,310,656	665,004	9.12	1.10	1.20	0.61	754
2012(P)	1,211,509	108,989,326	1,066,981	533,535	9.00	0.88	0.98	0.49	519

BSE: Blood Smear Examined

ABER: Annual Blood Smear Examination Rate (percentage of blood smears examined in a year of total population)

Fig 1: Trend of Malaria Cases And Deaths 2001-2012

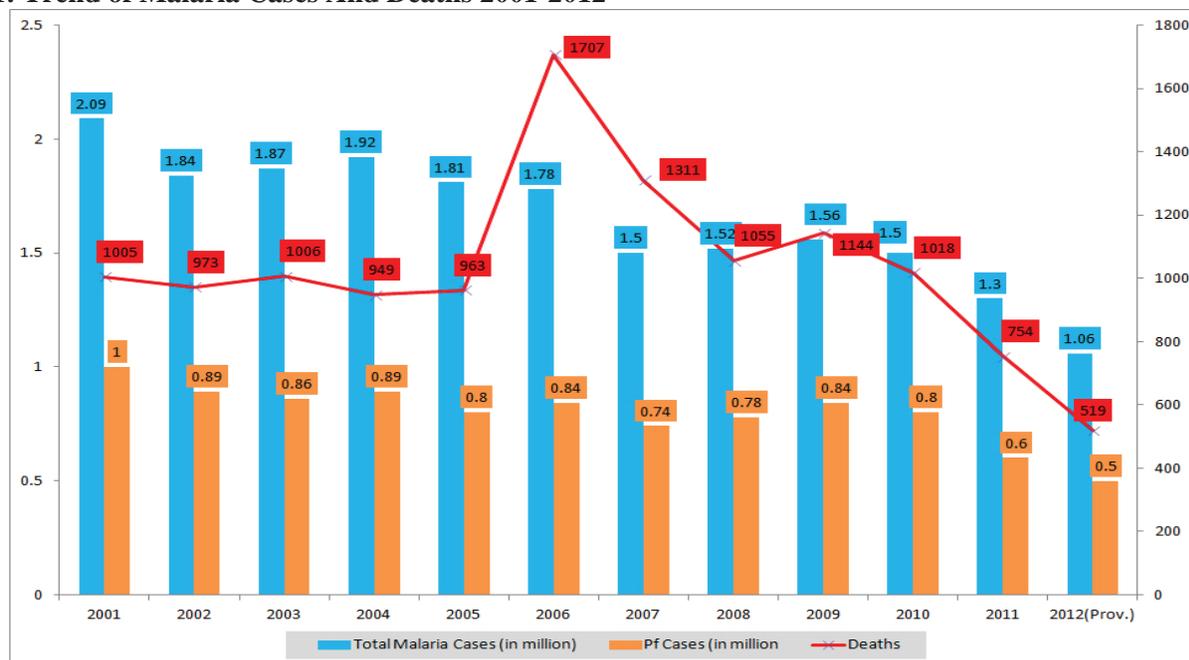


Fig 1 shows that the cases have consistently declined from 2.08 million to 1.06 million during 2001 to 2012. Similarly Pf cases have declined from 1.0 to 0.53 million cases during the same period. Less than 2000 deaths were reported during all the years within this period with a peak in 2006 when an epidemic was reported in NE States. The country SPR has declined from 2.31 to 0.98 and SFR has declined from 1.11 in 2001 to 0.49 in 2012. This indicates declining overall endemicity of malaria in the country.

ANNEX I: CO-FINANCING LETTERS

सुशील कुमार
अपर सचिव
SUSHEEL KUMAR, IAS
Additional Secretary
D.O.No.4 (2)/3/2011-IC (GEF)



भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
नई दिल्ली - 110003
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FORESTS &
CLIMATE CHANGE
NEW DELHI-110003

25th February, 2015.

Subject: - Co-funding for UNIDO/UNEP/GEF FSP on "Development and Promotion of Non POPs Alternative to DDT".

Dear *Mr Juergen,*

This is in continuation to our letter dated 27th May 2014.

The committed co-funding for this project is USD 43.3 million for which the break up is as follows:

- USD 6 million (in kind) from Ministry of Environment, Forests and Climate Change
- USD 3.3 million (in kind) from Ministry of health and Family Welfare
- USD 15.5 million (in kind) from CSIR-National Botanical Research Institute
- USD 17.476 million (in kind) from Hindustan Insecticides Limited
- USD 67,500 (in cash) and USD 532,000 (in kind) from UNIDO
- USD 424,000 (in kind) from UNEP

with regards,

Yours sincerely,

(Signature)
(Susheel Kumar)

Mr. Juergen Hierold
GEF Executive Coordinator
UNIDO, Vienna.

Copy to:

1. Ms. Brennan Van Dyke, GEF Executive Coordinator, UNEP, Nairobi.
2. Mr. Bishwanath Sinha, Joint Secretary, MoEFCC and National Focal Point for Stockholm Convention on POPs.
3. Mr. Tarun Bajaj, Joint Secretary, DEA and GEF Political Focal Point.
4. Ms. Ayumi Fujino, Representative, UNIDO Co.



इंदिरा पर्यावरण भवन, अलीगंज, जोर बाग रोड, नई दिल्ली-110 003 फोन : 011-24695242, फैक्स : 011-24695260
INDIRA PARYAVARAN BHAWAN, JOR BAGH ROAD, NEW DELHI-110 003 Ph. : 011-24695242, Fax : 011-24695260
E-mail : asmefsusheel@gmail.com

शशि शेखर
SHASHI SHEKHAR, IAS



अपर सचिव
पर्यावरण एवं वन मंत्रालय
(भारत सरकार)
Additional Secretary
Ministry of Environment and Forests
(Government of India)

D. O. No. 4 (2)/3/2011 – IC (GEF)
Dated: 27th May 2014

To: **Mr Juergen Hierold**
GEF Executive Coordinator
UNIDO, Vienna

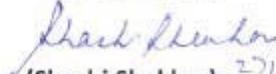
Subject: Endorsement of UNIDO & UNEP/ GEF FSP on "Development and Promotion of Non POPs Alternative to DDT"

This is in continuation to our earlier letter endorsing the PIF. In my capacity as GEF Operational Focal Point for India, I confirm that the above project proposal (a) is in accordance with my government's national priorities and our commitment to the Stockholm Convention of Persistent Organic Pollutants; and (b) was discussed with relevant stakeholders, including National Focal Point for Stockholm Convention.

I am pleased to endorse the FSP developed by UNIDO & UNEP and submitted to GEF for CEO endorsement. If approved, the project will be jointly implemented the by Ministry of Health and Family Welfare and Ministry of Chemical and Fertilizers, Government of India along with UNIDO & UNEP. The total GEF financing already allocated for this FSP amounts to USD 10 million excluding agency fee of UNIDO and UNEP from the chemicals focal area.

I request UNIDO & UNEP to ensure a) a combined annual submission of the Project Implementation Reports (PIRs) to GEF OFP India office; b) keep us duly informed and involved in the project's monitoring and evaluation exercise; and, c) ensure that GEF OFP India is a member of the Project Steering Committee.

Yours sincerely,


(Shashi Shekhar) 27/5/14

Additional Secretary
& India's GEF Operational Focal Point

Copy to:

- Ms Brennan Van Dyke, GEF Executive Coordinator, UNEP, Nairobi
- Mr Ajay Tyagi, Joint Secretary, MoEF and National Focal Point for Stockholm Convention
- Mr Nilaya Mitash, Joint Secretary, DEA
- Ms Ayumi Fujino, Representative, UNIDO India



जहाँ है हरियाली।

पर्यावरण भवन, सी.जी.ओ. कॉम्प्लेक्स, नई दिल्ली-110 003, दूरभाष : (011) 24364687, टेलीफैक्स : (011) 24362388

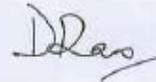
File No. T. 14020/21/2014-VBD
Government of India
Ministry of Health & Family Welfare
VBD Section

Nirman Bhawan, New Delhi
Dated the 12th January, 2015

Subject:-UNIDO-GEF project, **“Development and Promotion of non-POP Alternatives to DDT”**.

I am directed to refer to your letter dated 25/11/2014 on the above subject and to convey “in principle” agreement with the above mentioned project on co-financing support of US\$ 3.33 million in kind. I am further directed to convey that UNIDO will specifically mention that our support will be in the form of utilizing our existing technical expertise in Institutions NVBDCP, NCDC & NIMR instead of support in cash, as already clarified in the letter from the UNIDO regional Director.

This issues with approval of Secretary (H).



(Dr. C. V. Dharma Rao)
Director (CCD/VBD)
Tel. No. 2306 2432

To

Ms. Ayumi Fujino,
UNIDO Representative in India and
Regional Director for South Asia,
UN, House, 55 Lodhi Estate,
New Delhi - 110001



हिन्दुस्तान इन्सेक्टिसाइड्स लिमिटेड
(भारत सरकार का उद्यम)
HINDUSTAN INSECTICIDES LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)



Ref. No.:MS/PD/UNIDO/DDT Alt.
May 08, 2014

Dr.S P Dhua,
Regional Coordinator, RENPAP,
United Nations Industrial Dev. Organisation,
55, Lodi Estate,
New Delhi-110003.

Sub.: Development and Promotion of non-POPs Alternatives
to DDT.

Dear Sir,

This has reference to the discussions on 7.5.2014.

As explained, HIL will only be happy to associate with the above project. The project will be co-financed as per approval of Board/Deptt.of Chemicals & Petrochemicals, Govt.of India.

Thanking you,

Yours faithfully,

(Dr. T. Basu)

Deputy Manager(PD)
for Chairman & Managing Director.

SCOPE Complex Core - 6, 2nd Floor, 7 Lodi Road, New Delhi - 110003
Phone : 24361107, 24368802, 24362100, 24365012, 24364662 • Cable : INSECTCIDE • FAX : 24362116, 24361363
E-mail : hilhq@nde.vsnl.net.in • Website : www.hil-india.com

Production Units : • Rasayani, (Maharashtra) • Udyogamandal, (Kerala) • Bathinda, (Punjab)



सीएसआईआर-राष्ट्रीय वनस्पति अनुसंधान संस्थान
CSIR-National Botanical Research Institute

(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद, नई दिल्ली)
राणा प्रताप मार्ग, लखनऊ - 226 001, उ.प्र., भारत
(Council of Scientific & Industrial Research, New Delhi)
Rana Pratap Marg, Lucknow - 226 001, U.P., India



डॉ. चन्द्र शेखर नौटियाल

टाटा इनोवेशन फेलो, एफएनए, एफएनएससी, एफएनएएस
निदेशक

Dr. Chandra Shekhar Nautiyal

TATA Innovation Fellow, FNA, FNASc, FNAAS

Director

NBRI/UNIDO/2014

14.03.2014

Sub.: "Development and Promotion of non - POPs alternative to D.D.T." - project by
CSIR-NBRI in collaboration with UNIDO.

Dear Dr. Dhua,

This has reference to visit of Dr. Y.P. Ramdev, National Technical Advisor, UNIDO from 15-16 January, 2014 and thereafter UNIDO team (Ms. Eriinda Galvan, Drs. Zoltan Csizer, S.P. Dhua and Y.P. Ramdev) on 05.03.2014 to discuss implementation of "Development and Promotion of non - POPs alternative to D.D.T." project by CSIR-NBRI in collaboration with UNIDO.

Dr. S. Kumar, Principal Scientist & Nodal Officer has already communicated the minutes to Dr. Y.P. Ramdev on 17.01.2014 as per the discussions held during his visit from 15-16 January, 2014.

It was indeed a good opportunity to discuss with you all at CSIR-NBRI on 05th March, 2014 about the various aspects of the project. I would like confirm that CSIR-NBRI is in principle agree to implement the project proposal including the co-financing mentioned in project proposal. Dr. S. Kumar shall be working closely with Dr. Y.P. Ramdev to finalize and fine tune the project proposal and thereafter the proposal will be submitted to UNIDO with an advance copy to CSIR, for its approval.

It may be mentioned that project will be taken up at CSIR-NBRI after the receipt of UNIDO approval for funds and thereafter approval of Contract will be done following various channels including CSIR Headquarter as per obligatory requirements.

With warm regards,

Sincerely yours,

C. S. Nautiyal

(C. S. Nautiyal)

Dr. S.P. Dhua,
Regional Coordinator,
United Nations Industrial Development Organization,
55, Lodi Estate,
New Delhi - 110003.

CC: 1. Dr. Y.P. Ramdev, National Technical Advisor, UNIDO
2. Dr. S. Kumar, Scientist & Nodal Officer

Project Title :

Development and promotion of non persistent organic pollutants (POPs) alternative to DDT.

Project Component :

- **Promotion and propagation of new cultivars of NEEM**
- **Development and Promotion of Neem based pesticides as alternative to vector control**

Submitted by :



**CSIR - NATIONAL BOTANICAL RESEARCH INSTITUTE
LUCKNOW.**

1. INTRODUCTION:

Neem (*Azadirachta indica* A. Juss.) is high valued, multipurpose evergreen tree found in the Indian subcontinent and Southeast Asian countries. The medicinal and pesticidal properties (known for more than 2000 years) makes it as one of the most versatile medicinal plants. *A. indica* A. juss and *M. azadirachta* are two closely related species belonging to family Meliaceae. The former is popularly known as Indian neem (margosa tree) or Indian lilac, and the later as Persian lilac. Neem is an evergreen tree, cultivated in various parts of the Indian subcontinent.

Over 2400 plants are known to elaborate insecticidal and insect repellent constituents, but only neem is well known for providing a highly effective, non toxic and environmentally harmless means of controlling or eliminating insect pests which inflict losses in agricultural production. Every part of the neem tree is useful in one way or the other. The seed is important part of the vegetable oil and biopesticidal compounds. Neem seed kernel consists of azadirachtin and other limonoids such a nimbin, silanin and milantriol. However, azadirachtin is the most important limonoid and is known to possess antifeedant, attractant, repellent, growth disrupting and larvicidal properties against a large number of pests. These properties are attributed to the presence of azadirachtin, a ring C-seco tetranortriterpenoid. Seeds which contain oil at roughly 40% dry weight are a rich source of azadirachtin and its concentration in neem seed oil ranges from 50 to over 4000 mg l⁻¹. Azadirachtin either repels insects or prevents their larvae from entering the next instar for pupation.

Conventionally, neem is propagated by seeds. Neem seeds require immediate planting after harvesting as they are recalcitrant. This limits distant contribution of seeds and storage for year-round availability of propagules. Seed propagation also has the disadvantage of heterogeneity as a result of cross-pollination. Further, neem seeds from different geographic regions are known to vary considerably with respect to Azadirachtin content and bioactivity.

Intensive research during the past several years for a safer insecticide has resulted in the identification of neem as the best alternative to toxic pesticides due to its quick biodegradability, non-residual agricultural produce and too low toxicity. It is undemanding tree and grows successfully on all types of soils.

Macro propagation techniques and its importance :

Plant reproduction by seeds is the most common method of propagation, is usually inexpensive, and is easy for most field crops and vegetables. This is possible in homozygous plants and in annual plants for which pure seeds can be produced by backcrossing, in a relatively short time. However, most perennial heterozygous cultivated plants, including many ornamental plants, plantation crops, and fruit trees, are propagated vegetatively by a variety of techniques (i.e., cuttings, layering, separation, division, grafting, and budding), resulting in true-to-type clonal plant material. These methods are also known as Macro-propagation. Clones in horticulture and forestry are important for following main purposes:

Clonal propagation through macro-propagation techniques is currently gaining importance in forestry especially in developed countries like India. The most common method of macropropagation of plants is by using mist chamber. A sophisticated mist chamber involves investment on equipment, structure and maintenance. It also requires regular water flow, and continuous supply of electricity to heat/cool the green house structure. This technique has been efficiently utilized to produce rooted cuttings of several difficult-to-root species at CSIR-NBRI, Lucknow. Various plant species, including Neem have been successfully propagated through this indigenous low cost technique.

Tissue Culture techniques and its importance :

Neem is represented by a large number of genotypes which differ in their active principle contents. The conventional method of propagation of neem , both sexual and vegetative have the constraints that restrict their large scale multiplication and its commercial exploitation. The main limitations in sexual propagation are the recalcitrant nature of seed with short span of viability and high heterozygosity. In case of vegetative propagation by cuttings, problem of rooting, availability of cuttings of right maturity, particular season of the year and presence of disease causing organisms within the material are the main constraints. As a result, cloning and multiplication under field conditions is virtually impossible. All these limitations make it imperative to develop *in vitro* process for cloning of mature neem trees of proven traits.

Moreover, the *in vitro* process developed for rapid clonal multiplication of a mature tree of neem is of great practical importance, as most of the desirable characteristics appeared only at maturity. Besides *in vitro* cloning through nodal stem segments, augmentation of rate of clonal multiplication by inducing differentiation of multiple shoots from leaflets deserves special mention in raising 'clonal neem orchards'.

Why Soil meta genomics and its important :

Understanding the microbial diversity is always important, because they are involved in ecosystem functioning and carrying out biogeochemical cycles. These microorganisms play several important roles in adaptation, conservation and restoration biology of higher plants and study of microbial communities are excellent models for understanding biological interactions. The rhizosphere, is the region around the plant roots which harbors a wide array of microbial populations, including bacteria and fungi which may be beneficial, neutral or detrimental to plant growth. Among the different groups of microbes which colonize the rhizosphere, plant root-beneficial microbe interactions are very important both economically and ecologically. Studies of rhizosphere structure and functioning have proved difficult because of the complexity of this soil compartment. However, advances in the development of analytical tools such as to use Biolog plates, which permit microbial communities to be characterized according to their community level physiological profiling of microorganisms in the rhizosphere can be estimated by a technique using a commercially available microtitre plate to assess the potential functional diversity of the bacterial population through sole carbon source utilization patterns. Patterns of carbon substrate metabolism have been used to characterize microbial communities from environmental samples. This method has been used successfully to assess potential metabolic diversity of microbial communities in plant rhizosphere. In principle, the Biolog

Page 2 of 11

system provides a community level physiological profile (CLPP) or a metabolic profile of the bacterial or fungal community's ability to utilize specific carbon sources. CLPPs can differentiate between microbial communities, are relatively easy to generate reproducible and produce a large amount of data reflecting metabolic characteristics of the communities. However, it has also some limitations such as the selection for only culturable microorganisms, capable of growing under the experimental conditions favours fast growing microorganisms is sensitive to inoculum density and reflects the potential, and not the in situ, metabolic diversity. Nonetheless, CLPP is useful when studying the functional diversity of soils and is a valuable tool especially when used in conjunction with other methods.

Use of cultivation dependent methods can only provide information for less than 1% of total community, to explore more than 99% cultivation independent methods needs to be used.

Metagenomics referred to analysis of microbial diversity by cultivation independent methods to exploration of all microbial diversity in consortia that reside in environmental sample. Strategies for metagenomics studies directed at examining microbial composition or the broader issue of tackling phylogenomic diversity of highly complex microbial populations. One basic approach is to identify microbes in a complex community by exploiting universal and conserved targets such as 16S rRNA genes. This is a rapidly growing field of research that aims at studying uncultured organisms to understand the true diversity of microbes, their functions, cooperation and evolution, in environments such as soil, water etc. Although it is clear that microbial communities play an important role in these natural systems, estimating microbial phylogenetic diversity is intrinsically interesting to many microbiologists, but it also plays a crucial role in the functional analysis of microbial communities.

In general, changes in plant growth and their associated microbial diversity are reflected with the soil types, physicochemical properties and nutrient contents. Soil and plant nutrient analysis can be correlated with the microbial diversity data will provide us better understanding towards adaptation of neem cultivars at 4 different locations.

Accordingly it is propose to evaluate the functional diversity based on carbon source utilization pattern, diversity of uncultivable microbes of microbes associated in the Neem rhizosphere along with soil and plant nutrients, for 5 years over the 3 seasons/year during a total period of 5 years. The information will enable us to understand the role of resident microflora in their adaptation and growth performance adaptation of different cultivars at different agro climatic locations.

CSIR-NBRI has been involved in neem research in past two decades and reported wide variations in azadirachtin content in neem seeds among various provenances. Also, variations in azadirachtins are usually attributed to climatic conditions such as temperature and humidity. The study undertaken to evaluate qualitative and quantitative variability in azadirachtins A and B and oil content among various neem provenances or individual neem trees (43 provenances and 28 individual neem trees) has revealed significant differences in oil content, azadirachtin A, total azadirachtin (A + B), and A:B ratio. The studies have also proved that production and quality of neem kernels is greatly

influenced by environmental factors. The provenances or individual neem trees collected and evaluated earlier are being conserved at various units of CSIR-NBRI's Distant Research Centres.

In this project we wish to address the development and promotion of new dwarf neem (*Azadirachta indica*) cultivars with early maturity and higher limonoid yield which have been identified by the National Botanical Research Institute (NBRI). These cultivars would be propagated using the tissue culture and clonal propagation techniques. NBRI will also evaluate the functional diversity based on carbon source utilization pattern, diversity of uncultivable microbes of microbes associated in the Neem rhizosphere along with soil and plant nutrients to understand the role of resident microflora in their adaptation and growth performance for adaptation of different cultivars at different geoclimatic locations. The data generated in the project will be digitized for developing a web based information system using GIS. The information system will facilitate a) Making information available online for public and promoting use of Neem cultivars as an alternate to D.D.T. through out India; and b) Monitoring of propagation pattern of cultivars in various locations of India.

The proposed project will support adaption of these technologies in propagating new neem cultivars across agro-climatic zones to achieve increased limonoid production at four sites in the beginning, boosting yield of neem seed/kernels that would help compensate for the replacement of DDT. The following are the objectives of the project:

2. OBJECTIVES:

- I. To select, validate and propagate germ plasm of neem cultivars developed by NBRI which are dwarf, early maturing with high limonoid at NBRI field station for adopting in the program.
- II. To develop the protocols of the selected neem cultivars for their *in vitro* multiplication and large scale clonal propagation through macro propagation and tissue culture.
- III. To evaluate the functional diversity of neem cultivars based on carbon source utilization pattern and diversity of microbes associated in the Neem rhizosphere so as to facilitate propagation at a larger scale.
- IV. To propagate and test Neem cultivars initially 4 different agro climatic zones/locations i.e. (i) Lucknow (North Central), (ii) Shillong (North East), Chandigarh (North) and (iv) Bangalore (South).
- V. To digitize data (collection, compilation & curation) and develop information system using GIS.
- VI. To make information on propagation & Neem projects available on line for public as well as monitor online propagation pattern and progress in degraded land throughout India and thus promoting use of Neem cultivar as an alternate to DDT.
- VII. To facilitate distribution & production of Neem products using UNIDO technologies for the benefit of human kind.

3. ACTIVITY MILESTONES:

Sl. No.	<u>ACTIVITIES</u>	Year 1	Year 2	Year 3	Year 4	Year 5
1.	<u>MACRO PROPAGATION</u>					
1.1	Clonal propagation: setting up of green house's & maintenance of cultivars in field station of DRC, NBRI.	*	*	*	*	*
1.2	Conservation of neem cultivars & recording of observation on their growth.	*	*	*	*	*
1.3	Production of samples for quality evaluation.	*	*	*	*	*
1.4	Multiplication by clonal propagation of selections.	*	*	*	*	*
1.5	Supply of quality planting material for tissue culture of plant material for development of large scale neem populations.	*	*	*	*	*
1.6	Setting up of multi location trials for evaluation of growth, yield & quality at 4 agroclumatic sites viz., 1. North East (Shillong) 2. North Central (Lucknow) 3. North (Chandigarh) 4. South (Bangalore)		*	*	*	*
1.7.	Developing & demonstrating agro forestry models to make neem plantation economically viable for farmer & general public			*	*	*
2.	<u>TISSUE CULTURE :</u>					
2.1	Optimization of nutrient media for multiplication of shoots in all the established Neem cultivars.	*	*	*	*	*
2.2	Optimization of rooting, acclimatization of field transfer of in vitro regenerated shoots.			*	*	*
2.3	Large scale in vitro propagation of			*	*	*

	responding cultivars following developed protocol.					
3.	<u>SOIL METAGENOMICS :</u>					
3.1	Study of Carbon utilization pattern	*	*	*	*	*
3.2	Soil metagenomics	*	*	*	*	*
3.3	Soil nutrient analysis		*	*	*	*
3.4	Neem nutrient analysis		*	*	*	*
3.5	Evaluation of adaption of different cultivars in 4 different agro-climatic zones.				*	*
4.	<u>INFORMATION SYSTEM AND PUBLIC AWARENESS</u>					
4.1	Digitization, collection, compilation & curation of data, stored in herbarium specimens on occurrence of Neem species in India	*	*	*	*	*
4.2	Development of Source Codes & online Information System using GIS tools & techniques.		*	*	*	*
	Training programmes / workshops for promoting :		*	*	*	*
a)	Online information model for monitoring plantation facilitating large scale plantation.		*	*	*	*
b)	Popularizing applications & uses of neem as an alternate to chemical pesticides		*	*	*	*
c)	Online agroforestry model for facilitating neem plantation economically viable for farmers and public.		*	*	*	*
5.	<u>HUMAN DIMENSIONS:</u> Scaling of Neem products					
5.1	Training on UNIDO technologies for production of Neem products	*	*			
5.2	Identification of a partner for large scale production.	*	*	*	*	*

5.3	Popularizing use of Neem products against the Malaria.	*	*	*	*	*
5.4	Finalize production of Neem products in P.P.P. Mode.	*	*	*	*	*

4. BUDGET

S.N o.	Particulars	Year 1	Year 2	Year 3	Year 4	Year 5	Total in INR Lacs	Total in US \$
		Projected	Projected	Projected	Projected	Projected		
I-	Non Recurring							
1	Equipments							
1.1	Shaker incubator & other minor equipment for tissue culture.	5.00					5.00	8333.33
1.2	Equipment for quantitative analysis of trace elements and to perform Nitrogen and protein content analysis	100.00					100.00	166666.67
1.3	Poly house / Green House / Water System Irrigation equipments etc. at five locations and Equipments GIS Arc Enterprise Server / Arc Editor / Source Code etc.	80.00					80.00	133333.33
1.4	Equipments (Depulpers, Crushers Grinders, decorticator, dryers, Coil making Machines, Pellet making Machines, Packing Machines for creams) for product development & demonstration	140.00					140.00	233333.33
	Total	325.00	0.00	0.00	0.00	0.00	325.00	541666.67
II-	Recurring							
2	Contingency							
2.1	Tissue Culture	1.00	1.00	1.00	0.00	0.00	3.00	5000.00
2.2	Soil Meta genomics	5.00	5.00	5.00	0.00	0.00	15.00	25000.00
2.3	Field Consumables	1.00	1.00	1.00	0.00	0.00	3.00	5000.00
2.4	Extension material	1.00	1.00	1.00	0.00	0.00	3.00	5000.00
2.5	MLT Expenses	2.00	2.00	2.00	0.00	0.00	6.00	10000.00
2.6	Irrigation/Water supply/Field labour etc.	2.00	2.00	2.00	0.00	0.00	6.00	10000.00
2.7	Maintenance/UPS Power supply for controlled environment	10.00	9.00	8.00	0.00	0.00	27.00	45000.00
2.8	Computer Consumables, Software upgrades, internet etc.	4.00	4.00	4.00	0.00	0.00	12.00	20000.00
3	Consumables							
3.1	Plasticware & Glassware	3.00	2.00	2.00	0.00	0.00	7.00	11666.67
3.2	Chemicals	5.00	5.00	5.00	0.00	0.00	15.00	25000.00
4	Manpower (Temporary & Contractual)							
4.1	QHF - 1 Nos.	12.00	12.00	12.00	0.00	0.00	36.00	60000.00
4.2	PA - 3 Nos.	6.00	6.00	6.00	0.00	0.00	18.00	30000.00

4.3	Contractual Labour (HS X 5)	5.00	5.00	5.00	0.00	0.00	15.00	25000.00
5	Travel	20.00	15.00	10.00	0.00	0.00	45.00	75000.00
6	Training Programs / Awareness Programs / Workshops etc.	0.00	3.00	3.00	0.00	0.00	6.00	10000.00
7	Miscellaneous Expenses / Overhead	2.25	2.05	2.00	0.00	0.00	6.30	10500.00
8	Setting up of Neem products demonstration cum production centres Pilot facility	3.50	3.50	3.00	0.00	0.00	10.00	16666.67
8.1	Space rental, Infrastructure support cost, Manpower etc.	25.00	25.00	25.00	0.00	0.00	75.00	125000.00
8.2	Neem Product development technology- Training, Production, Distribution, Awareness etc.	20.00	20.00	20.00	0.00	0.00	60.00	100000.00
	Total	127.75	123.55	117.00	0.00	0.00	368.30	613833.33
	GRAND TOTAL (I + II)	452.75	123.55	117.00	0.00	0.00	693.30	1155500.00

Co - Financing by NBRI								
1.1	Field Stations for Germplasm maintenance (8000 sqmtr.) - 1	250.00	250.00	250.00	250.00	250.00	1250.00	2083333.33
1.2.	Field Station (For MLT) - Bangalore (2500 sqmtr.)	90.00	90.00	90.00	90.00	90.00	450.00	750000.00
1.2.	Field Station (For MLT) - Chandigarh (2500 sqmtr.)	90.00	90.00	90.00	90.00	90.00	450.00	750000.00
1.2.	Field Station (For MLT) Shillong (2500 sqmtr.)	90.00	90.00	90.00	90.00	90.00	450.00	750000.00
1.2.	Field Station (For MLT) Lucknow (2500 sqmtr.)	190.00	190.00	190.00	190.00	190.00	950.00	1583333.33
2.1	Sr. Principal Scientist - 4 (1.60 * 4 * 12) at NBRI	77.00	77.00	77.00	77.00	77.00	385.00	641666.67
2.2	Existing Farmers Training center	150.00	150.00	150.00	150.00	150.00	750.00	1250000.00
2.3	Sr. Principal Scientist - 4 (1.60 * 4 * 12) at outside Lucknow	77.00	77.00	77.00	77.00	77.00	385.00	641666.67
2.4	Principal Scientist - 4 (1.40*4*12)	67.00	67.00	67.00	67.00	67.00	335.00	558333.33
2.5	Senior Scientist - 2 (0.90*2*12)	22.00	22.00	22.00	22.00	22.00	110.00	183333.33
2.6	Scientist - 4 (0.70*4*12)	34.00	34.00	35.00	34.00	34.00	171.00	285000.00
2.7	Technical Officer - 8 (0.50*8*12)	1.60	1.60	1.60	1.60	1.60	8.00	13333.33
3	Network Infrastructure/ Leased Line Rental etc.	160.00	160.00	160.00	160.00	160.00	800.00	1333333.33
4	Electricity / Tubewell etc.	30.00	30.00	30.00	30.00	30.00	150.00	250000.00
5	Scientific Laboratory Setup / Building Rental etc.	120.00	120.00	120.00	120.00	120.00	600.00	1000000.00

6	Administrative, Finance Staff & Purchase Staff - 3 /Diarist /Security (1.0 * 6 * 12)	72.00	72.00	72.00	72.00	72.00	360.00	600000.00
7	Existing Equipment Maintenance	40.00	40.00	40.00	40.00	40.00	200.00	333333.33
8	Existing Equipment Cost	200.00	200.00	200.00	200.00	200.00	1000.00	1666666.67
9	Existing Gen Set/UPS Network/Fire safety system	100.00	100.00	100.00	100.00	100.00	500.00	833333.33
	Total	1860.60	1860.60	1861.60	1860.60	1860.60	9304.00	15506666.67

Note: *2.2 Contingency for soil meta genomics sample study of one location for 4 successions and budget will enhance accordingly if study is to be conducted in all the four sites and more than once/ year.



(Dr. S. Kumar)
PI/Nodal Officer & Principal Scientist &
Head Bioinformatics & ICT

Dr. SUDERSHAN KUMAR, M.Sc. Ph.D
Principal Scientist & Head Bioinformatics & ICT
CSIR-National Botanical Research Institute
Lucknow-226001

Dr. C.S. Nautiyal
Director, CSIR-NBR

डॉ. सीएस नौटियाल
Dr. C.S. Nautiyal
Director
कृषि विभाग-राष्ट्रीय वनस्पति अनुसंधान संस्थान
C.S.I.R. National Botanical Research Institute
लखनऊ, Lucknow



UNITED NATIONS ENVIRONMENT PROGRAMME

Programme des Nations Unies pour l'environnement Programa de las Naciones Unidas para el Medio Ambiente
Программа Организации Объединенных Наций по окружающей среде برنامج الأمم المتحدة للبيئة
联合国环境规划署



Email contact: Heideloire.fiedler@unep.org

Our Ref: UNEP GEF POPs (HF)

Date 11 November 2013

Subject: UNEP/DTIE, co-financing towards the project "Development and promotion of non-POPs alternative to DDT" in India

Dear Ms. Niamir-Fuller,

The Chemicals Branch, UNIDO and the government of India have jointly developed the above-mentioned project "Development and promotion of non-POPs alternative to DDT". Further, the Chemicals Branch has committed towards the executing agencies, Ministry of Environment and Forestry, Ministry of Chemicals and Fertilizers, the Ministry of Health and and Family Welfare, to support the implementation of this project.

On behalf of UNEP/DTIE, I hereby confirm a co-financing contribution to this project of up to USD 424,000. This contribution comprises the following for the execution of the project:

- USD 414,000 staff time over five years from Chemicals Branch (corresponding to 10% of one P5 position on legal framework, 15% of a P3 position on Long Lasting Insecticidal Nets, and 5% of one D1 and one P5 position each on supervision and DDT/chemicals management expertise, in Geneva) and
- USD 10,000 of consultant support from the Global Alliance to Alternatives to DDT.

Yours sincerely,

Tim Kasten
Head, Chemicals Branch
Division of Technology, Industry and Economics

Ms. Maryam Niamir-Fuller
Director, GEF Coordination Office
Nairobi, Kenya

cc: David Piper, Heideloire Fiedler, Jorge Ocaña, DTIE Chemicals Branch

Chemicals Branch // Substances chimiques
Division of Technology, Industry and Economics // Division technologie, industrie et économie
11-13, chemin des Anémones, CH - 1219 Châtelaine, Geneva, Switzerland
Fax: +41 22 797 34 60 // Web: www.unep.org/hazardoussubstances/



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

VIENNA INTERNATIONAL CENTRE
P.O. BOX 300, A-1400 VIENNA, AUSTRIA

TELEPHONE: (+43 1) 260 26-0

FAX: (+43 1) 269 26 69

www.unido.org

unido@unido.org

19 December 2013

Dear Dr. Ishii,

Please refer to our submission to the GEF Secretariat for final review and approval of our Full-sized Project "Development and promotion of non-POPs alternative to DDT".

This project has been designed to introduce bio- and botanical pesticides and other locally appropriate cost-effective and sustainable alternatives to DDT as first step for reduction and eventual elimination of dependency on DDT, ensuring food safety, enhancing livelihood and protecting human health and the environment.

I am writing to confirm UNIDO's contribution in the amount of US\$ 67,500 (in cash) as well as US\$ 532,000 (in-kind) as co-financing to this project. The UNIDO Environmental Management Branch (EMB) GEF-5 Facility Funds has approved and release of funds upon approval of the project by GEF.

Yours Sincerely,

A handwritten signature in black ink, appearing to read "Philippe Scholtès".

Philippe Scholtès
Officer-in-Charge

Programme Development and
Technical Cooperation Division (PTC)
UNIDO GEF Focal Point

Dr. Naoko Ishii
Chief Executive Officer and
Chairperson
Global Environment Facility
1818 H Street
Washington, D.C. 20433
USA

ANNEX J: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS⁶

A. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES FINANCING STATUS IN THE TABLE BELOW:

PPG Grant Approved at PIF: USD 300,000			
<i>Project Preparation Activities Implemented</i>	<i>GEF/LDCF/SCCF/NPIF Amount (\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent To date</i>	<i>Amount Committed</i>
Activity 1. Coordination mechanism for PPG management and organization - PPG coordination group were formed that monitored the activities and reviewed the outputs. - National and international consultants were selected and recruited for the collection of baseline data and information. - Technical working group has been established, their roles and responsibilities were defined for the management of the project. - Information exchange and communication system established amongst the identified experts and partners. A number of meetings were organized with the consultants. - National Project Coordinator identified, who coordinated the PPG activities.	30,000	27,000	3,000
Activity 2. Identification and engagement of key stakeholders in public and private sectors - Stakeholder workshop organized - A series of consultations with identified key institutions namely Hindustan Insecticides Limited (HIL), Institute of Pesticide Formulation Technology (IPFT), National Vector Borne Disease Control Programme (NVBCP), National Institute of Malaria Research (NIMR) held and thus all were involved in the project preparation. It was agreed that these institutions will also be involved during the implementation of the main project. - Key stakeholders involvement to the project agreed	45,000	20,000	25,000
Activity 3. Compilation of baseline data and needs assessment for the project design and document preparation - Baseline data collected covering biological control, chemical control, environmental management, vector resistance data, LLIN usage together with legislative measures and alternative approaches. Data collected was then	180,000	100,000	80,000

⁶ If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities.

<p>compiled and assessment made.</p> <ul style="list-style-type: none"> - Assessment made on the needs to cover all components of the IVM in public health programme. - A visit to the Bt facility n Wuhan and Neem plantation site in Kunming, China organized to study the manufacturing facility of Bt based pesticides and neem based pesticides. - Monitoring and results indicators identified 			
<p>Activity 4: Detailed design of project components, work plan and implementation arrangements</p> <ul style="list-style-type: none"> - The project document with components description, results framework and detailed budget drafted in line with the GEF/UNIDO/ UNEP requirements. The document elaborates project components, objectives, scope and strategy, methodological tolls and activities to be financed,outcome and output indicators including targets and their baseline considering demonstration of global environmental benefits. - Project coordination mechanisms and execution arrangements have been finalised and included in the proeject document. - Project reporting, monitoring and evaluation plan discussed and included in the project document. - Stakeholders involvement plan developed. - Confirmation of co-financing from relevant stakeholders on-going - Final workshop to endorse the project will be organized. 	45,000	15,000	30,000
Total	300,000	162,000	138,000

ANNEX K: ABBREVIATIONS

AWP	Annual Work Plan
BAT	Best available techniques
BEP	Best environmental practices
Bt	Bacillus thuringiensis
Bti	Bacillus thuringiensis var israelensis
CSIR	Council of Science and Industrial Research
DDT	Dichloro-diphenyl-Trichloroethane
DTIE	Division of Technology, Industry and Economics
ESM	Environmentally sound management
GEF	Global Environment Facility
GFATM	Global Fund for Aids, Tuberculosis, Malaria
GoI	Government of India
HIL	Hindustan Insecticide Limited
HRD	Human Resource Development
ICMR	Indian Council of Medical Research
IPFT	Institute of Pesticide Formulation Technology
IPM	Integrated Pest Management
IRS	Indoor Residual Spray
IVPM	Integrated Vector Pest Management
LLIN	Long lasting insecticidal bed nets
M&E	Monitoring and Evaluation
MoA	Ministry of Agriculture
MoCF	Ministry of Chemicals and Fertilizers
MDG	Millennium Development Goal
MoEF	Ministry of Environment and Forests
MoHF&W	Ministry of Health and Family Welfare
MT	Metric tonnes
NBRI	National Botanical Research Institute
NCDC	National Centre for Disease Control
NGOs	Non-governmental Organisations
NKAE	Neem Kernel Aqueous Extract
NIMR	National Institute of Malaria Research

NIP	National Implementation Plan
NMRC	National Malaria Research Centre
NPCU	National Project Coordination Unit
NPD	National Project Director
NPFE	National Portfolio Formulation Exercise
NPM	National Project Manager
NSC	National Steering Committee
NVBDCP	National Vector Borne Disease Control Program
PFD	Program Framework Document
PIF	Project Identification Form
PIR	Project Implementation Review
PMIS	Project Management Information System
POPs	Persistent Organic Pollutants
PPG	Project Preparation Grant
PSC	Project Steering Committee
R&D	Research and Development
RENAP	Regional Network of Pesticides in Asia and Pacific
SAICM	Strategic Approach to International Chemicals Management
TOR	Terms of Reference
TWG	Technical Working Group
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNIDO	United Nations Industrial Development Organization
VHSC	Village Health Sanitation Committee
WB	World Bank
WP	Wettable powder
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme

ANNEX L: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF/NPIF Trust Fund or to your Agency (and/or revolving fund that will be set up)