UNITED NATIONS ENVIRONMENT PROGRAMME
GLOBAL ENVIRONMENT FACILITY
PROJECT DOCUMENT
SECTION 1 - PROJECT IDENTIFICATION

1.1	**Sub-Programme Title:**	International Waters – OP#10: Contaminants OP#14 – POPs
1.2	**Project Title:**	Reducing Dependence on POPs and other Agro-Chemicals in the Senegal and Niger River Basins through Integrated Production, Pest and Pollution Management
1.3	**Project Number:**	IMIS: GFL / 2328 – 2732 - PMS: GF/ 4030 – 06 –
1.4	**Geographical Scope:**	Multi-country: Benin, Guinea, Mali, Mauritania, Niger and Senegal
1.5	**Implementation:**	FAO Viale delle Terme di Caracalla 00100 Rome, Italy Tel: (+39) 06-57052725 Fax: (+39) 06-57054657
1.6	**Duration of the Project:**	48 months Commencing: 01 July 2008 Completion: 30 June 2012

1.7 Cost of the Project:[1]

COSTS AND FINANCING (MILLION US$)

GEF	Project:	$ 4,105,330
	PDF A:	$
	PDF B:	$ 372,500
	SUBTOTAL GEF	$ 4,477,830
Co-financing:	Bilateral—Netherlands:	$ 2,800,000
	Sweden:	$ 267,000
	Governments :	
	in kind:	$ 666,488
	cash:	$ 333,244
	FAO (in-kind):	$ 391,428
	PDF B Co-Financing:	$ 369,350
	Sub-Total Co-Financing:	**$ 4,827,510**
	Total Project Cost:	**$ 9,305,340**

[1] **Regarding differences in Co-financing between "At Work Program" and "At CEO Endorsement"**

1. Netherlands: since Work Program approval the Netherlands IPM project was fully formulated and approved with additional funding for the GEF "sister" project approved at US $2.8 million.
2. FAO/USAID funds: the original funds were part of a large grant ($10 million) tied to work on the Desert Locust Emergency. Towards the end of the funding cycle the GEF project was awarded $450,000 for working in communities affected by the DL. However, in 2005 the DL emergency quickly subsided and the funding that remained was withdrawn by the donor for use on other projects, notably the Avian Flu crisis.
3. Sweden: the GEF project received $267,000 for capacity building for the Ecotoxicology Laboratory, CERES Locustox.
4. FAO in-kind contributions have been slightly increased based on new estimates
5. Farmer participation (in-kind) and UNEP co-financing were eliminated due to the additional cash contributions by the Netherlands and Sweden.

1.8 Project Summary:

The project is focused on the two principal river basins in the West African sub-region, the Niger and Senegal River Basins, and addresses riverine contamination issues related mostly to irrigated-farming activities. Trends in all six countries are towards increased use and dependence on agro-chemicals, which has, ironically, contributed to declining long-term agricultural productivity, environmental quality and human well-being, through toxic contamination of food-chains and disruption of ecosystem services, such as natural pest suppression and pollination. Explosive outbreaks of pest problems are often triggered by insecticide use (insecticide-induced pest resurgence). Other negative trends include decreasing soil fertility, contamination of waterways, detrimental shifts in aquatic ecosystems, and overall degradation of human and environmental health. The social and economic drivers leading to current unsustainable agricultural practices include a lack of awareness among communities regarding both the impacts and negative externalities associated with pesticide use, as well as a lack of awareness of feasible, sustainable and more profitable alternatives.

Riverine areas support the highest proportions of natural biodiversity and it is also these areas where people concentrate to collect water for cooking and drinking, where they bathe and where domesticated animals are watered. The project objectives are to raise awareness of problems and alternatives, determine baseline values for agricultural practices and water quality; then begin first efforts to monitor the aquatic systems, develop and extend feasible and sustainable alternatives, and help improve organizational and decision-making capacities within and among stakeholders and communities in six riparian countries of the Senegal and Niger Rivers.

The project addresses both OP#10—International Waters Contaminants and OP#14—POPs reduction. It will develop local and national-level awareness-raising activities; policy studies on national pesticide use patterns, and create links with national and regional pesticide legislative bodies. It will build capacity in a regional ecotoxicology laboratory, execute water-quality assessment studies in six countries, run simulations on likely movement and fate of toxic chemicals in aquatic systems and estimate quantifiable risks to human health; at the same time help communities adopt improved, alternative production methods and community-based pesticide-monitoring systems and, finally, promote develop local, national and regional networks of stakeholders interested in improving the current situation. The outcomes will provide national and regional-level decision-makers with solid examples for addressing integrated development objectives and satisfying international treaty commitments. Outcomes will include substantially lowered pesticide use in the riverine communities—particularly the most toxic types, while at the same time substantially increasing yields and net revenues for farmers.

The current project proposal adheres closely to the country priorities, as indicated in the POPs National Implementation Plans (NIPs) and various National Strategies for sustainable agriculture.

Signatures

For FAO:	**For UNEP:**
José M. Sumpsi Assistant Director-General Technical Cooperation Department UNFAO	David Hastie, Chief, Budget and Financial Management Service, UNON.
Date: _____	Date: _____

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Background and Context

1. The **Senegal and Niger River** basins that are the focus of this project are both transboundary areas. Both rivers have their sources in the mountains of Guinea and flow northwards. The Senegal River forms a natural border between Senegal, Mali and Mauritania. The Niger River crosses Mali and Niger and forms the border between Niger and Benin. For decades, the Senegal River has been subject to significant large-scale development, principally the establishment of the Diama dam in 1986 and the Manantali dam in 1988. Benefits from the operation of these dams include, in addition to increased electricity production (Manantali only), the increased availability of freshwater throughout the entire year. This leads to opportunities for enhanced multiple use of water, including increased crop irrigation and improved continuity of drinking water supplies. The adverse effects of the dams include increased incidence of water-borne diseases, changes in the seasonal downstream flow and sediment impoverishment in downstream areas.

2. The inland delta of the Niger River (in Mali) encompasses some 40,000 hectares of surface waters at peak annual flood periods, making it the largest floodplain zone in Africa. In comparison to the Senegal River, the inland delta of the Niger River has been subject to less hydrological modification and is also less contaminated. The delta of the Senegal River and the inland delta of the Niger River have both been declared natural common heritage sites by UNESCO and contain a total of five Ramsar Convention sites. In combination, the two rivers serve as refuge for more than 130 species of water animals (including fish, hippopotamus, alligator and manatee) and 350 bird species, of which 108 are long-distance migrants from Europe. The expansion of intensive irrigated agriculture in the sub-region has been coupled with the introduction and overuse of agro-chemicals, particularly pesticides.

3. Agriculture in the six countries is dominated by small-holder plots on the order of a mean size of approximately 0.5 ha. The project will target small-holders working with high-value crops (rice, vegetables and cotton), most of which are under irrigation by surface waters from the two major rivers in the region. The rationale for this choice being that these populations comprise the principal source of pesticide use in these countries and these communities are the principal populations and ecosystems at risk from water contamination. Recognizing this is a demonstration project, nevertheless the total agricultural land area targeted by the project is significant. The project has as its target the training over four years of 30,000 farmers in six countries, with an estimated land under cultivation of approximately 15,000 hectares. The project is part of a larger programme of farmer training for which an additional 100,000 farmers are targeted for season-long training; hence, the project will have outcomes that reach a much wider audience. The extent that farmers will transfer the lessons learned from the Farmer Field Schools to their own land holdings is an outcome that will be measured as part of the planned monitoring of project impact. A rough estimate of the surface areas of interest are as follows:

- **Benin**: The total amount of land irrigated under cultivation in the project zones of action is estimated at 19.700 ha, of which 1,266 ha are under controlled irrigation (the remaining is cultivated as recession agriculture and “bas fonds”. All three cropping systems are included with rice, vegetables and cotton. The amount of cotton grown in the project zone represents 35% of the total area under cultivation in the country.
- **Guinea**: The area under partial or total irrigation in the project zones of action is estimated at less than 15,000 ha.

- **Mali**: the total area under controlled irrigation in the project zone is around 83,500 ha of a total national area irrigated of 170,000 ha. The future estimated potential for irrigation (based on estimates of water flow of the Niger) is a staggering 2 million hectares. All three cropping systems are represented in the project zone of action.
- Mauritania: the total potential agricultural land under management is estimated to be around 42,000 ha, of which around 20 000 ha are put into production each year in the project zone. Rice and vegetables are the two cropping systems of importance.
- Niger: The potential irrigated land is estimated at 140,000 hectares along the Niger River Basin, of which about 40,000 are in production and in the project zone. Crops of concern to the project in Niger are only rice and vegetables.
- Senegal: The potential irrigated land is around 500,000 hectares of which half is located in the Senegal River Valley. The project zone of action has potential access to around 94,320 ha actually under production (the parastatal SAED manages 46,066 ha, and private holders manage 48,254 ha). Rice and vegetable systems are the systems targeted for the project.

4. Senegal, the site of the PDF-B activities, represents perhaps the most "modernized" agriculture in the sub-region, although still dominated by small-holder plots. Crop intensification and diversification policies in the Senegal River Valley, since the creation of dams and intensified irrigated agriculture beginning in the early 1980s have been partially based on an "industrial" model, involving the use of state-owned tractors and combine harvesters that are rented by groups of small farmers, whose collective land area is amenable to large-scale equipment. This model has shown many problems (see Annex J for root-cause analysis) and the economic reality is that returns to farming in this approach are only slightly or sometimes not at all profitable. In terms of crop protection, the agronomic model was based on the *assumption* that dependence on chemical pesticides was necessary for productivity and profitability. In all fairness, this same assumption was made in most countries at that time. Chemical treatments have been the most frequently used method of pest control and farmers often resort to routine treatments according to a set timetable without any assessment of pest infestation. Research and farmer practice in tropical irrigated rice systems in the intervening 25 years has shown this crop-protection model is rarely very effective for preserving or increasing production and for the vast majority of cases either provides cost but no benefit, or actually causes disruption of natural biological control and leads to increased problems. A slightly stronger argument can be made for the need for pesticide use in vegetable production, but here non-toxic alternatives exist but are not widely known. Attention to proper soil fertility management and non-toxic, bio-pesticide alternatives, show demonstrated benefits in terms of production, profit and environmental well-being. Cotton represents the biggest challenge in the sub-region, it being the worst-case example of overuse of chemical fertilizers and especially pesticides. The argument is still being made by some that cotton cannot be grown in tropical environments without frequent applications of toxic pesticides, yet many examples exist to show the contrary (see Annex F for outcomes from the sub-regional IPPM project for all three cropping systems).

5. It is often generally assumed that pesticide use results in higher yields. In fact this is rarely the case outside company field trials. The published evidence from independent scientists overwhelmingly supports the fact that rather than controlling pests, pesticide use commonly leads to more frequent and more serious outbreaks due to the elimination of the dominant, but more sensitive, arthropod populations (predacious and parasitic organisms). Farmers, unaware of this counter-intuitive mechanism, often feel compelled to find ever more toxic compounds, or to increase the frequency of application of existing pesticides. This leads to a counter-productive, self-reinforcing feedback-loop, or the so-called "*pesticide treadmill*", in which pesticide use begets more pest problems, begets more pesticide use (see Root Cause Analysis, Annex J). High levels of pesticide use, together with increased runoff from synthetic fertilizers, can cause radical shifts in aquatic ecosystems towards

stable alternative states. These alternative states, once achieved, may be equally resilient, but much less desirable from human-use perspectives.

6. Another important source of pesticides derives from the periodic outbreaks of locust populations that occur in the sub-region on a roughly 10-to-15 year cycle. These outbreaks typically engender an international response that includes very large quantities of pesticides donated to local governments. It is from these past locust campaigns that dieldrin, the principle POPs pesticide found in the PDF-B water samples, originally came into the sub-region. The other source of dieldrin contamination in Senegal has in the past been the commercial sugarcane areas near the town of Ricard Toll. The company no longer uses dieldrin. Obsolete stockpiles of pesticides remaining from past locust campaigns are the subject of another GEF co-financed project executed by FAO, the African Stockpiles Programme. However, local market survey and results from the PDF-B water sampling, strongly suggest that dieldrin is still actively being used by farmers. It is highly likely that dieldrin from these obsolete stockpiles have entered into use by local populations of farmers through informal channels.

7. Since the end of field activities of the PDF-B, a large-scale locust outbreak has again taken place in the sub-region. While the anti-locust (POPs) insecticide, dieldrin is no longer on the donor list, the sub-region has nevertheless been inundated with pesticides. It is difficult to know exact statistics, but some sources estimate 3 million litres of ULV pesticides have been sprayed in the sub-region during the last year. Existing stocks are estimated by FAO consultants to be around 2 million litres of concentrated ULV pesticides. Senegal is known to be holding some 900,000 litres of locust pesticides. Most of these stocks are situated along the Senegal River, as this is the northern-most boundary of the country where locusts are most likely to appear, and from where the base of operations against locusts has traditionally been located. At the time of final revision of this document for Work Program submission the locusts have moved to North Africa and it seems unlikely they will reappear. If they do reappear, then aerial and ground treatments will continue. If they do not reappear, then the Sahelian countries will again be faced with a potential obsolete pesticide-storage problem. History of the sub-region shows these stores are likely to show up in back-channel markets, being sold to farmers. A real threat for farmers comes from the fact that ULV formulations for locusts are highly-concentrated, oil-based formulations for use in specialized aircraft and ground equipment, and not safe for use by farmers, who typically mix emulsifiable concentrate (EC) formulations with water for use in back-pack sprayers. Whereas EC formulations typically have low dermal toxicity, ULV formulations are oil-based, lipophilic substances readily absorbed by the skin. Mistakenly mixing a ULV formulation as an EC poses serious risks. Finally, the PDF-B field activities included a year-long sampling of water from three locations in the Senegal River delta, *which took place prior to the current locust outbreak.* These PDF-B data are therefore a baseline from which subsequent sampling during the proposed full-phase project might be able to detect pesticides attributable to the locust campaign.

8. The pesticides used in this part of Africa contain approximately fifty different active ingredients, of which a large number are classified as “highly toxic” or “toxic” (corresponding to WHO categories Ia, Ib and II). A survey conducted in 2003, during the PDF-B phase of this project, among 500 farmers in the Senegal River basin estimated that about 95% of the growers are neither informed nor aware of the hazards associated with pesticide use (see Annex D). Misuse and overuse of agro-chemicals on the local scale causes serious damage to the environment and poses severe risks to human health in many West African countries, specifically those participating in this project. A related study conducted by CERES/LOCUSTOX and the FAO Global IPM Facility in 2001 revealed the extent to which persistent and toxic pesticides such as dicofol, lindane and dieldrin were in use in market gardening and, more recently, in sugarcane cropping. The study also confirmed the widespread use of several highly toxic organophosphorus pesticides in current government plant

protection practices. The latter are predominantly WHO category Ib and class II pesticides such as carbofuran, endosulfan, dichlorvos, methamidophos, methomyl, dimethoate, triazophos and other organophosphorus insecticides. Analyses of pesticide residues conducted in the framework of the PDF-B revealed levels of dieldrin in two areas of the study region that are 200 km apart. The concentrations of dieldrin were found to be between 0.18 and 3.04 µg/L in eight samples and between 0.27 and 0.47µg/L in two samples. According to the ecotoxicologists at Locustox in Senegal, and also at Alterra, in The Netherlands, the high levels of dieldrin residues found in drainage canals indicate *that dieldrin is still actively being used, despite its prohibition by the country*[2]. The CERES/Locustox study for the PDF-B *estimates that 30,000 litres of dieldrin are in the marketplace,* a quantity that corresponds to amounts that disappeared from obsolete stocks prior to the current removal programme. A socio-economic study on pesticide use in Mali[3] revealed that the volume of pesticides found in Malian markets in 1998 was close to 5,400 tonnes of formulated chemicals representing, in value, about 1.9% of GDP.

9. UNEP was the implementing and executing agency for a previous GEF-supported project entitled "*Regionally Based Assessment of Persistent Toxic Substances*". The outputs from this project include a Regional Report for Sub-Saharan Africa covering 46 countries, including the six countries in this project. The conclusions of this study contain the following statements of relevance to the current project proposal:
   - *Sub-Sahara is mainly an agricultural continent and it has been using pesticides for pest and disease control for more than 50 years. Except for South Africa and Zimbabwe, no systematic pesticide monitoring/analysis exist in all the countries of the region.*
   - *During the 1970 - 1979 period, only seven PTS were reported (DDT, dieldrin, endosulfan, lindane, toxaphene, PCBs and HCB) whereas in the second period (1980 - 1989), the period of awareness, banning and/or restriction, this number increased to nine (DDT, dieldrin, endosulfan, Lindane, toxaphene, PCBs, HCB, heptachlor and atrazine). DDT, Lindane, endosulfan, dieldrin, PCBs and HCB were common to both periods.*
   - *From the data gathered through filled questionnaires, the trend of concentration observed in Sub-Sahara Africa for PTS is DDT> PCBs> toxaphene. These same data apparently indicate that humans were less directly exposed than animals and vegetation to PTS during the period 1970 - 2002. However the main risk remains the food-web contamination. The occurrence of relatively high levels of DDT, PCBs and dioxins/furans in adipose tissues and blood of occupationally exposed persons is of immense concern. Equally disturbing is the high levels of HCB, Lindane and endosulfan in human breast milk in the region, in view of WHO's vigorous campaign that mothers breast milk is best for children. It has been established by studies in South Africa that organochlorine Pesticides (OCPs) can be transferred to infants via breast milk. Thus infants are being exposed to these xenobiotics while the toxicological hazards and risks have not been studied in many sub-Sahara African countries.*
   - *Many cases of accidental or intentional release of large amounts of PTS (for fishing or hunting) causing severe stress to the environment and humans have been reported in the region. For example, the accidental release of organochlorine pesticides (OCPs) in large quantities had caused massive fish kills in many countries, such as* ***Senegal****, Nigeria and Kenya.*

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[2] In fact dieldrin has never been formally banned by Senegal, nor has its importation been banned yet under the Rotterdam Convention. However, if we use the adoption of the CILSS Common Pesticide Regulation as the date after which only Sahelian Pesticide Committee-registered pesticides are allowed in Senegal, one could say that the use of dieldrin was *de facto* not allowed after 1992.

[3] Camara, M., F. Haïdara, and A. Traoré. 2001. Etude socio-économique sur l'utilisation des pesticides au Mali. Institut du Sahel, Université de Hanovre, FAO, Bamako.

- *A major constraint towards the sustainable management of these hazardous chemicals is the lack of and/or weak enforcement of regulations. For the region to contribute effectively in the global effort to reduce PTS, there is need to establish and/or strengthen existing institutions and legal framework through capacity building and putting in place necessary mechanisms for compliance monitoring and enforcement.*
- *Capacity building needs in the region deserve priority action to ensure global success of the recent Stockholm Convention on POPs and other international regulations for the environmentally sound management of PTS and other hazardous chemicals.*

10. Adverse effects on human health are highly likely to be occurring in the sub-region, although no systematic study has been carried out. Such effects are mediated by human exposures to active agents through the food chain for bio-accumulative substances; contamination of subsurface waters (*e.g.*, shallow wells); and through swimming, bathing and washing in contaminated surface waters or watercourses in which residues and metabolites have accumulated in sediments that can be disturbed by human activities. This has been confirmed by studies carried out by CERES/LOCUSTOX[4].

11. Sustained exposures through these pathways are likely in the long run, to cause congenital malformations and the appearance of various pathologies such as carcinoma and dysfunction of the immune and reproductive systems. The basic enquiries carried out during the PDF-B phase revealed instances of accidents leading to mortality and acute poisoning[5].Country reports prepared during the PDF-B presented, from all six countries, a history of poisonings and fatalities due to pesticides. Beside these accidents, there are other infections with non-specific symptoms that might unknowingly be related to these substances. The individuals consulted during the PDF-B surveys from the health centres noted, without assuming an immediate correlation, an increase of the number of cases of diarrhoea, respiratory and dermatological infections and high incidence of increased blood pressure in the areas where irrigation is occurring. During the various diagnoses made together with the populations, the populace also drew a relationship between the development of malaria and schistosomosis in the Senegal River valley and the scale of irrigation and the enhancement of permanent water supplies as a result of dam construction. In addition to agrochemicals, other substances are used by industry and in programmes for controlling disease vectors. From 1987 to 2002, the Onchocercosis Programme in Guinea, in the fight against River Blindness, sprayed more than 700,000 litres of pesticides containing organophosphates, carbamates and pyrethroids.

12. Among the various agro-chemicals used by growers in the Senegal and Niger River basins, Dieldrin was in use over many years and actively imported until quite recently. As discussed above, dieldrin is most likely still in use in the sub-region. POPs are persistent because they resist photolytic, chemical and biological degradation. POPs generally are semi-volatile—they evaporate relatively slowly. Persistent substances with this property tend to enter the air, travel long distances on air currents, and then return to earth. The colder the climate, the less POPs tend to evaporate, resulting in their migration to, and accumulation in polar regions; hence, their global concern. POPs generally have *low water solubility* (they do not dissolve readily in water) and high lipid (fat) solubility (they do dissolve easily in fats and oils). Persistent substances with these properties *bio-accumulate* in fatty tissues of living organisms. In the environment, concentrations of these substances can increase by factors of many thousands or millions as they move up the food chain. Interest and concern regarding POPs dates to the late 1960s, when scientists began compiling evidence of injury to fish, birds and

[4] FAO, LOCUSTOX Project, Volumes I, II, III

[5] ENDA-Pronat. 2003. Analyse des donnees d'enquete sur la sante et les pratiques agricoles, pp. 16. ENDA Tiers Monde, Dakar.

mammals in or around the Great Lakes in the US. In some of these cases, the predominant POPs sources were relatively nearby; in others, they were thousands of kilometers distant. Documented injuries were especially prevalent in high predator species and included: (a) reproductive failure and population decline; (b) abnormally functioning thyroids and other hormone system dysfunctions; (c) feminization of males and masculinization of females; (d) compromised immune systems; (e) behavioral abnormalities; (f) tumors and cancers; and (g) gross birth defects. Their disposal by combustion creates other POPs, such as polychlorinated dibenzo-p-dioxins and dibenzofurans that are similarly persistent and toxic. For these reasons the international community established the Stockholm Convention in May 2002 to engender coordinated international action to reduce the threat posed by these compounds. Dieldrin, which was found in the Senegal River during the PDF-B phase, was one of the most commonly used POPs pesticides in West Africa.

13. In the context of the low levels of education and awareness among the population in the study area, the lack of protective measures, the irresponsible packaging of pesticide formulations without hazard labelling and the habit of buying cheap pesticides of questionable and possibly fraudulent origin, the health risks posed to the local populations, although not yet measured, are likely to be significant[6]. While men apply pesticides, women, children, old and sick people are also vulnerable due to their physiologies and possibly their roles in society (e.g., gathering water and washing clothes).

14. ***Agroecological Context (baseline).*** The principal socioeconomic root causes (drivers) underlying the existing agroecological problems in the member countries (Annex J) include historical inertia from years of chemical pesticide use coupled with commercial pressures from a long-established pesticide industry. Furthermore, governments lack national monitoring procedures and generally the ability to enforce existing and new regulations. Farmers lack a general level of education, including basic literacy and specifically lack awareness of the many externalities associated with pesticide use as well as sustainable alternative and more profitable agricultural production models. These factors together continue to drive overuse and misuse of pesticides and to a lesser extent an overuse or misuse of chemical fertilizers. Both pesticides and, to a lesser extent, fertilizers act as environmental pressures on aquatic and terrestrial systems, which in turn result in damage to system states (water, soil, biodiversity) and inflict negative impacts in terms of human health, agricultural productivity, ecosystem services (e.g., pollination and pest suppression) and, ultimately, the environmental, social and economic well-being of riverine communities in the six countries.

15. The project proposes to address the most important of these specific proximate drivers by: (i) improving awareness among stakeholders (sub-regional structures, governmental structures, non-governmental organizations, farmer organizations and target communities) of the externalities associated with pesticide use, (ii) improving awareness and skills among stakeholders related to sustainable alternative agricultural practices, and (iii) demonstrating the methods, feasibility and importance of a community-based approach to monitoring pesticides and pesticide use, supported by an analytical capability in the sub-region for detecting aquatic-based chemical contaminants. The long-term outcome of the project will ultimately improve environmental, economic and social well-being of the riverine communities through education of stakeholders leading to improved productivity, reduced input costs, drastically reduced toxic loads in the hydrological systems. The project will help reverse the trend towards environmental contamination from pesticides by "turning off" the demand for pesticides at the local level.

[6] ENDA-Pronat, ENDA-Santé, and Ceres-Locustox. 2001. Proposition de recherche sur les altérations des écosystèmes et santé humaine dans un contexte d'intensification agricole:Cas de la moyenne vallée du fleuve Sénégal

GEF Programming Context

16. This project relates both to Operational Program 10 International Waters (Contamination) and Operational Program 14 Persistent Organic Pollutants and in both cases focusing on Strategic Priority #3 (Demonstration of innovative and cost-efficient technologies). Also, because the project aims to prevent the contamination of biologically rich aquatic systems, home to internationally protected habitat, it will have benefits in the area of biodiversity.

17. Each of the countries is signatory to a diverse array sub-regional and international agreements related to pesticides, water, biodiversity and the environment, and have developed, in accordance with these, a variety of national laws, strategies and action plans. A list of related legislative actions and international agreements was compiled for each country by national consultants working for their respective National Technical Steering Committees set up during the execution of the PDF-B phase. These reports are on file (in French).

National and Sub-Regional Context

18. The countries party to the project have subscribed to various international agreements and conventions to reflect their commitment to promoting the reduction of pesticide use and the prevention of pollution. These include the Basel Convention on the control of transboundary movements of toxic wastes and their disposal, the Rotterdam Convention on Prior Informed Consent (PIC) and the Stockholm Convention on POPs. At the African level, countries have subscribed to OAU Conventions on Plant Protection; Inter-African authorization of Herbicides; the Bamako Convention prohibiting toxic waste imports, the international Convention on Biodiversity and the FAO *International Code of Conduct on the Distribution and Use of Pesticides*. Efficient and harmonized implementation of all these conventions requires a good understanding of their provisions and the ways in which local populations can contribute to their achievement. Initiatives towards alternatives and pesticide management are already under way.

19. As part of the Stockholm Convention the countries have developed, or are in the process of developing National Implementation Plans (NIPs), which already mentioned above will have specific ties to the project in terms of information exchange. The NIP for Senegal has put elimination of dieldrin as one of their top priorities, therefore the project will be clearly helping to address some of the specific priorities of the member countries with regards to POPs and close linkages between the national NIPs committees and the project's National Technical Steering Committees (NTSCs) will be established and maintained. In each country members of the NIPs committee are also the some of the same members found on the project NTSC; therefore, helping to ensure country drivenness and sustainability of project goals and activities after the project has ended.

20. Regional Pesticide Registration Committee. In the four Sahelian countries involved in the project (Senegal, Mauritania, Mali and Niger) the *Comité Sahelien des Pesticides* (CSP), a subsidiary body of CILSS, is responsible for the evaluation and registration of pesticides. The CSP started operating in 1994, and received technical support from FAO through a Dutch-funded regional pesticide management project, from 1998 to early 2002. This registration system is based on a regional Convention (the "*Common Regulation for the Registration of Pesticides in CILSS Member States*" – revised in 1999), which was adopted unanimously, and has to date been formally ratified by Parliaments of 8 of the 9 CILSS member states. For the two humid-zone countries (Benin and Guinea) a parallel structure exists with the *Comité Phytosanitaire des Pays de la zone Humide de l'Afrique de l'Ouest et du Centre* (CPH/AOC). For both structures, national-level registration has been superseded in favour of regional registration by the CSP and CPH/AOC. The pesticide industry

submits dossiers for review to the structures. The structures can refer to CERES/Locustox, in Dakar, for environmental testing. Countries can adopt more strict guidelines than those adopted by the CSP and CPH/AOC, or, in emergencies (e.g., locust outbreaks), the registration standards can be temporarily relaxed. *Depending on the outcome of the water quality analyses over the course of the project, these two regional pesticide regulation bodies would be an appropriate conduit to communicate findings to the member states with regard to possible transboundary pesticide transport issues.*

21. In 1999, FAO's Global IPM Facility initiated a pilot project in Mali, with financial support from the Netherlands, to strengthen the national system of extension and agricultural research based on a decentralized, participatory training approach for groups of small-scale farmers in so-called "Farmer Field Schools" (FFS). The Farmer Field School (FFS) training model was first developed by FAO in Southeast Asia beginning in the late 1980s. Some 3 million farmers have undergone such training in Asia. The model has been actively developed on the African continent since the late 1990s. Over 25 impact studies have been conducted on the approach, and the results are encouraging. Today, around the globe, participatory farmer education, based on "adult education methods" is generally seen to be the preferred approach to what is termed "extension" methodology, and many variations on the methodological theme can be found. The Integrated Production and Pests Management programme (IPPM), through the FFS model, emphasizes a hands-on, experiment-based understanding of the physical, biological and ecological mechanisms underlying improved production methods, including soil-fertility management and alternative methods for pest control, while also developing topics related to social and economic issues. The success of the early pilot phase in Mali allowed the establishment of a USD $2.8 million, 4 year sub-regional programme in Mali, Senegal and Burkina Faso in 2001, also funded by the Netherlands. The programme has influenced adoption of the IPPM/FFS approach by the government of Mali in their World Bank financed PASAOP programme. Farmers having been involved in the season-long training have gained a full range of agronomic skills and greatly reduced the quantities of pesticides used in production. On average, farmers involved in the programme have substantially lowered input costs and increased yields and net incomes (Annex F). By the end of phase I (December 2005), some 25,000 farmers had undergone training in the three countries. The programme infrastructure was engaged in supporting the GEF PDF-B activities in Senegal (see Annex F for details of field-level results of GEF PDF-B sites). A second phase of the programme has been financed by the Netherlands and began operations in July 2006 with expanded scope to include a fourth country (Benin) and a greater emphasis on national institutionalization of the IPPM/FFS extension approach. This Phase II programme of USD $9.5 million explicitly includes plans in the three of the participating countries (Benin, Mali and Senegal) to support the training activities for the communities targeted in this GEF proposal as redirected baseline co-financing. A redirected baseline co-financing of $2,800,000 will cover half the costs of training (i.e., training costs for trainers and farmers in the three countries—Mali, Senegal and Benin—which are active in the FAO/Netherlands Sub-regional IPPM programme.

International Waters Context

22. The use of pesticides for agricultural purposes and their presence in the valleys of the Senegal and Niger Rivers give rise serious risks to humans and the environment. The chemicals involved pose a significant threat to flora, fauna and human health. These risks are increased by the increasing use of pesticides. The PDF-B took water samples from three sites along the Senegal River, showing that communities are drinking and bathing in water that would be unacceptable in Europe or North America. While the data show humans at risk, they particularly underline the risks to aquatic biota, on which the riparian foodwebs are based. Nineteen pesticides were detected at levels above the limits of quantification and of the total number of detections, ***40% were detected at levels greater than 100 times the Dutch Maximum Tolerable Risk (MTR) level*** (a measure of risk associated with aquatic

biota—see Annex E). The aquatic groups at greatest risk are the aquatic insects, fish and micro- and macrocrustaceans. The active compounds responsible for this potential ecological impact in the irrigation systems include dieldrin, dichlorvos, ethion, monocrotophos, lindane, deltamethrin and endosulfan. PDF-B surveys and country reports for all six countries note the incidence of dead aquatic organisms (usually fish) observed in rivers and irrigation canals.

Stockholm Convention Context

23. This project is consistent with the objectives and provisions of the Stockholm Convention on Persistent Organic Pollutants (POPs). To the extent that the agro-chemicals used in the Senegal and Niger River basins fall within the currently defined POPs under the Stockholm Convention, this project meets the specifications of GEF Operational Programme No. 14 on POPs and Strategic Priority 3 (demonstration of innovative and cost-efficient technologies). Through a community-based and participatory process the project will define an efficient procedure for "reducing pollutants and pollution, by involving and building capacity of populations (communities)",

24. Many conventions and treaties are often not implemented because there is little effective monitoring and the targeted populations do not understand their role. This project is intended to implement on-the-ground actions consistent with the intent of the Stockholm Convention involving the populations most at risk. The project will allow communities and governments to better understand and assess the risks to human and environmental health posed by agrochemical use mediated by direct exposures to pesticides and indirectly through environmental contamination of water. The project will be predominantly based on participatory and community-based approaches reinforced by state-of-the-art water-quality monitoring methods and GIS-based mapping and modelling. Collaboration with Oregon State University will provide access to new technologies for detecting pesticides based on a "Passive Sampling Device" (PSD), which is based on a semi-permeable membrane that is submerged in water or exposed to air. After exposure (days, weeks or months) the PSD can simply be shipped off to the laboratory in a plastic container; hence, avoiding the much more cumbersome older methods involving "grab samples" of water that need to be kept cool and are heavy and difficult to ship.

25. Three of the six participating countries (Senegal, Benin, Mali) had ratified the Stockholm Convention before submission of this document for approval (March 2005). Mauritania and Niger have subsequently ratified the convention. The other participating country (Guinea) is a convention signatory and ratification has been approved by their National Assembly. We have a copy of the ratification document, however we are still awaiting official transmittal of the instrument to the Stockholm Convention. The project activities will specifically support Article 3 and Annex A of the Stockholm Convention through capacity building and improving the awareness of local populations and authorities regarding the hazards of pesticides generally, and in particular contribute to the elimination of POPs (dieldrin) use by local populations, currently for sale on local black markets.

26. Once having ratified the Stockholm Convention, the Parties to the Convention are bound legally to ban imports on all POPs chemicals, except where exemptions apply (such as with some DDT for anti-malarial treatments). Such exemptions do not hold for agricultural uses in these countries. However, a very reasonable concern, if not certainty, will be that DDT, if exempt for medical use, will find its way into agricultural systems. This is commonly seen, for example, in illegal cotton pesticides showing up in vegetable production systems, underlining the importance of practical training and education at all levels. It should be kept in mind that the Stockholm Convention is progressively moving to add new chemicals. Two such candidates include the pesticides endosulfan and lindane.

Endosulfan is commonly used in cotton production areas and both chemicals were detected at environmentally damaging levels during the PDF-B.

INSTITUTIONAL COORDINATION AND SUPPORT

Core commitments and linkages

27. There exist GEF interventions in the International Waters Focal Area that have direct relevance and potential connection with this proposed project. These include a regional project entitled "Reversing Land and Water Degradation Trends in the Niger River Basin". This project involves *inter alia* integrated regional capacity building of the Niger River basin Authority (NBA) and local capacity building to manage local resources through community-based implementation of microgrant-supported interventions. Possible ties to the current proposal are evident from the statement in the Niger River Basin project: "The GEF project's technical components, through the microgrant-supported demonstration activities, will develop an understanding of the inter-relationship of better land management practices in agriculture, forestry, and other relevant sectors; and define mechanisms to improve water quality while reducing degradation of the regional diversity and ecosystem. Offering possibilities for cumulative rural socio-economic benefits for communities that depend on the land and water resources for their livelihood."

28. A second GEF project in the International Waters Focal Area is a regional project entitled "*Senegal River Basin Water and Environmental Management Program*". The objective of this project is to provide a participatory strategic environmental framework for the environmentally sustainable development of the Senegal River basin and to launch a basin-wide cooperative program for transboundary land-water management. The three governments through OMVS have embarked on the implementation of a program called PASIE (*Plan d'Atténuation et de Suivi des Impacts sur l'Environnement*). Priority concerns include environmental health and pollution is mentioned, but no mechanisms are in place for monitoring contaminants or working with communities in this regard.

29. A third GEF project in the sub-region includes the Futa-Djallon project, which will include the eight riparian countries of Gambia, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Senegal, and Sierra Leone The development objective of the Programme is to "ensure the rational use and the protection of natural resources existing in the Fouta Djallon Highlands and to help improving the living conditions of populations in the area as well as in areas irrigated by waters originating from the Highlands".

30. Given that all three of these projects have some elements related to health of the riverine environments, but do not have specific pesticide monitoring capabilities at the community level, the proposed GEF project can therefore play a complementary role in this regard. These projects may wish to adopt aspects of the approach presented in this project. Formal contacts will be established during initial meetings among project coordinators during the initial stages of this project, which will assure information exchange through half-yearly reports sent to the three projects. Specifically, results from the current project will be transmitted directly to the GEF-financed OMVS "*Observatoire Environmental*" as well as to the project coordination of the Niger Basin Authority (NBA). In addition, opportunities for further exchanges will be developed through participation of appropriate project staff, most likely at the Technical Steering Committee level, but perhaps for more technical staff, in workshops and meetings.

31. The project will provide important outcomes for each of the six countries in line with their respective *National Biodiversity Strategy and Action Plans* and *Country Reports to the COP*, as formulated as part of the Convention on Biological Diversity (CBD). Annual country reports will be sent to country focal points for the CBD.

32. Apart from GEF-supported POPs enabling activities in individual countries of the sub-region that have been referred to previously, there are two GEF initiatives in the POPs Focal Area that deserve reference. The first of these is the so-called 12 "*Country POPs Project*" (the project's formal name is "*Development of National Implementation Plans for the Management of Persistent Organic Pollutants (POPs)*". Guinea is a participating country in this project. The project, however, can be regarded as analogous to the GEF-supported individual country enabling activities for the National Implementation Plans (NIPs). *It was specifically recommended* during the second sub-regional stakeholders meeting (Bamako, March 7-8 2005) that the current project should develop formal linkages between the National Technical Steering Committees for this project and the national committees charged with the development and implementation of the POPs National Implementation Plans and that annual reports from the project be sent to the POPs committees. The project will contribute to the implementation of the NIPs by helping communities understand the risks of use, and the feasibility of alternatives to the use of black-market dieldrin.

33. The other POPs project is a regional project entitled "*African Stockpiles Program, Strategic Partnership 1*". Both Niger and Mali are participants in this project that is planned to enter its full project phase in the near future. The FAO will ensure annual reports and any intermediate important and relevant findings from the project are sent to the stockpiles project coordinator, once the stockpiles project commences. Communication has already started with regard to sharing new technologies for pesticide detection and joint interests in building capacity in regional laboratories.

Implementing Agency (UNEP) Programming Context

34. UNEP is the primary United Nations agency promoting the development of the *Strategic Approach to International Chemicals Management* (SAICM). This initiative was proposed by UNEP in 2002 as an outgrowth of the IFCS *Bahia Declaration on Chemical Safety* that includes priorities for action beyond 2000. The purpose of SAICM is to promote enhanced coherence of international and national activities in the field of chemicals management and incorporate chemical safety issues into sustainable development. The initiative was endorsed by the World Summit on Sustainable Development (WSSD) in 2002. In the same year, an inter-organization steering committee for SAICM was formed comprising representatives the seven agencies (*i.e.*, ILO, FAO, UNEP, UNIDO, OECD, WHO and UNITAR), the IFCS, UNDP and the World Bank) participating in the Inter-Organization Programme on the Sound Management of Chemicals (IOMC). SAICM is foreseen as a primary mechanism for enhancing human health and environmental protection from the effects of chemical exposures over the longer term and for meeting the WSSD target of improved chemicals management by 2020.

35. UNEP has many programmes and initiatives in relation to developing countries in Africa. UNEP is also the GEF implementing and executing agency for POPs Enabling Activities in three of the countries participating in this project, Benin, Mauritania and Senegal.

Executing Agency (FAO) Context

36. The Plant Protection Service of FAO includes the Global IPM Facility that will be executing this project. The Facility provides guidance on Integrated Production and Pest Management (IPPM) in

South and South-east Asia, the Middle East, Eastern Europe, Africa and South America and the Caribbean. The IPPM/FFS approach has been shown to increase farmer productivity and reduce input costs through the substantial reduction of pesticide inputs. It improves sustainability of agroecosystems by focusing on improving the knowledge and skills of farmers to enable better management of resources, and reduces farmers' dependence on procured inputs. The approach addresses a full range of agronomic topics, and stresses economic planning and decision-making skills, thereby offering a starting point to improve the farming system as a whole. FAO has been compiling curricula for Farmer Field Schools world-wide, and this offers the project the opportunity to adapt and modify training materials from existing programs, rather than starting from zero.

37. Currently in West Africa three of the six project countries are involved in an FAO-executed IPPM program with the support of the Netherlands (GCP/RAF/009/NET). This $9.5 million program provides $2.8 million cash co-financing to the GEF project. The four-year second phase programme began in June 2006 and will provide assistance in terms of redirected co-financing, trained personnel and the collective experience of sub-regional and headquarters management teams.

38. A Netherlands'-funded partnership programme with FAO (FNPP) is currently completing a second phase to last to June 2008. In this phase FAO has been asked to focus a cross-disciplinary effort in four countries world-wide. The countries chosen were India, Laos, Kenya and Mali. In Mali staff from 10 FAO services will be conducting small projects and case-studies on the theme of agricultural biodiversity. One sub-component will involve water resources in the Office du Niger, the assessment of the nature of aquatic biodiversity resources in use by rural populations, and the development of irrigated aquaculture, using a Farmer Field School approach. The rationale is that if rural people better recognize the extent of the benefits gained from aquatic resources, and also begin to benefit nutritionally and economically from aquaculture activities, they will be motivated to prevent further contamination of aquatic resources.

39. FAO has operated a programme for the prevention and elimination of obsolete pesticides since 1994. The GEF/World Bank/FAO "African Stockpiles Project" (ASP) is currently underway. The initial focus of the programme was Africa and the Near East. The new pesticide detection technologies being developed for the proposed project will also be of use to the ASP, enabling them to test waters in wells and even to test the air downwind adjacent to pesticide storehouses.

Consultation Coordination and Collaboration with ongoing and planned activities

40. Several related programmes have been developed within the participating countries, either through national initiatives or those of external agencies. These include the GEF-supported African Stockpiles Programme (ASP). As a further example, Mali is one of the participating countries that have developed several related initiatives. These include:
    - As previously mentioned, the sub-regional project GCP/RAF/009/NET oriented towards the extension of the IPPM methodology to rice farming, market gardening and cotton cropping as well as the development of information/raising awareness of IPPM and on the risks of using chemicals in pest control at a cost of about US$ 9.5 million;
    - The special initiative on integrated pest management, plant protection aspects and pesticide management under PASAOP financed by an annual World Bank fund estimated at 100 million F CFA ;
    - IPM/IER project/Virginia University that involves research in integrated pest management in market gardening in the Koulikoro area estimated at $144,000;

- "National Action Plan on Soil Fertility Management", which is a project for improving crop management in the area administered by the Office of Niger costing approximately $1 million

41. CERES/Locustox is a key partner in the proposed project and the only ecotoxicological research and training institute in the sub-region conforming to European standards for "Best Laboratory Practices". CERES/Locustox received certification/membership from an array of international organizations concerned with monitoring pesticide residues (see Annex E). As a Senegalese foundation, CERES/Locustox is independent and works with partners from the private sector, government and international agencies. Its training division has been working with farmer groups (*Comités Villageois*) since 1994. CERES/Locustox has a fully equipped analytical chemistry laboratory with a highly qualified staff. The institute has worked on the development of indicators for aquatic pollution by pesticides in the Sahel since 1989. Standard laboratory procedures for toxicity testing have been developed for laboratory based research, according to OECD and ASTM guidelines. The regional authorities for pesticide registration (CSP and CPH/AOC) have adopted these protocols. Major equipment used by Locustox:
    - Gas phase chromatograph with mass detector (GC/MS)
    - Two other Gas chromatographs (CPG/TSD/ECD/FPD)
    - Two high-performance liquid Chromatograph (HPLC) with UV and fluorescence detectors.
    - An atomic absorption spectrophotometer (SAA) for analysis of heavy metals.

42. Since 1982, the NGO ENDA Tiers Monde, through the team PRONAT (Natural Plant Protection), has been developing information and raising awareness programmes and experimenting with alternatives to chemicals with communities in the sub-region. PRONAT is currently conducting a programme of sustainable agriculture in three agro-ecological zones in the country most involved in pesticide use, including the Senegal River valley. It also organizes and supports awareness-raising on pesticide hazards and sustainable agriculture networks in the sub-region.

RATIONALE AND OBJECTIVES

43. The GEF alternative is intended to address the principal root causes underlying the existing agroecological and contaminant problems along the transboundary waterways in the six participating countries. As discussed earlier and in Annex J (Root Cause Analysis), the principal root causes (drivers) are related to lack of awareness at all stakeholder levels of the externalities associated with pesticide use, lack of monitoring and enforcement capabilities, a long-term history of vested commercial interests in the distribution and sale of pesticides, as well as lack of awareness of sustainable alternative "best practices" for agricultural production.

44. Building knowledge and technical capacity will be based on an expansion of the IPPM/FFS approach that has provided good results in other countries and that has been successfully applied in West Africa since 1999, and in Asia since the late 1980s. During the PDF-B phase, the process of informing and increasing the sensitivity of the local populations and authorities to the hazards and counter-productive outcomes associated with pesticide use was well received and had a positive influence on community perceptions and understanding. The communities showed much interest in committing themselves to finding alternative solutions. The experiences in Mali and Senegal during the Netherlands-funded IPPM project will serve to support and facilitate the establishment of improved agricultural management practices in the riparian habitats comprising the Senegal and Niger Rivers. The overall goal is to introduce a new form of agricultural training for farmers, through capacity building within government agencies, non-governmental organizations and especially community-based farmers' organizations, which will engender major changes in farming practices and substantial reductions in the use of chemicals for pest control, while increasing production levels, profitability

and sustainability. *By putting effective alternative methods at the disposal of grower communities through proven discovery learning methods, they will be able to optimize decision-making regarding the appropriate use of land and water resources and the selection of appropriate agricultural practices.*

45. The proposed GEF increment will expand on the existing IPPM/FFS programme in the sub-region with multiple objectives:
    - *Promote* understanding of a range of *environmental and human health* knowledge and issues, particularly those relating to the range of benefits from various ecosystem services, deriving from the riverine habitats, plus the specific threats posed by pesticides to the riverine habitat and therefore also to the health and well-being of the communities. Data from the water-quality samples will be put into a "hands-on" adult-learning format for use in an FFS context to support this objective;
    - *Demonstrate* feasible, economically and environmentally advantageous alternative production models. *The main barrier to adoption of agricultural methods that prevent contamination of fields and waterways is lack of knowledge and skills in the communities.* The hands-on educational approach of the FFS will help the farming communities demonstrate for themselves the feasibility of alternative, non-polluting methods.
    - *Develop* a community-based pesticide-monitoring system. This principal objective of the project involves farming communities surveying, monitoring and keeping track of trends in pesticide use in their own communities through development of an appropriate system for accounting for pesticide use in the communities (type, quantities, points of sale origin, time of use, crop type, etc.). Adoption of the system will be motivated by enhanced understanding of health, economic and environmental costs and risks associated with pesticide use and further motivated by a hands-on appreciation of a range of economically advantageous alternatives.
    - *Create* links among communities that share the same hydrological system flows ("upstream--downstream") to enable farmer-to-farmer advocacy and the sharing of information and experience, particularly information on the impact of production models on the environment[7] and the health of communities working and living in downstream areas.
    - *Disseminate* tools for community-based action-oriented analysis and planning, for the future of the river basins.

46. In addition to changing the perceived dependence by growers on pesticides, a related programme objective is to help farmers address a broader range of agronomic topics and new production methods, including expanded soil-fertility management training, training on new rice intensification methods that use substantially less water, and adopting irrigated aquaculture and rice-fish culture in those areas where this is feasible. The ultimate outcome will be more ecologically-based and economically sound agricultural production systems that show greater benefits to farmers, local communities and the countries involved, without the short and long-term costs to human health and the aquatic environment.

47. As mentioned above this full GEF project will contribute to the implementation of the Stockholm Convention on POPs through establishing direct links, and exchanging information with the national committees charged with development of the NIPs. The project will in effect be carrying out several of the operational goals specified in the NIPs (e.g., elimination of POPs pesticide use and development of local monitoring systems). It will also assist the participating countries to achieve the objectives set in UNCED Chapter 14, paragraph 21 (*i.e.*, sustainable agriculture) and the agriculture section of the Convention on Biological Diversity. It will promote movement away from the

[7] Especially for market gardening and cotton that generally exhibit substantially higher pesticide loads.

psychological dependence on agrochemicals, particularly on POPs, PTS and other highly toxic substances in the sub-region. It will also improve farmer yields and incomes while avoiding environmental contamination.

48. While the regional registration systems through CSP and CPH/AOC are currently fully operational, in practice this is only a part of the task of managing pesticides and there are still pesticides circulating in the countries that are not on the approved lists (including dieldrin). The proposed GEF project will be complementary to the activities of these two sub-regional structures by providing important feedback from the regional farming communities to the CSP and CPH/AOC in the form of annual reports based on the community-based surveys, community-based monitoring programs and laboratory water contaminant sampling data. In return, the project will receive current status on chemicals registered for use by the two regional structures, which will be used as part of the information and awareness raising efforts. A more active link may also be considered in which the structures request specific monitoring to be carried out within the framework of the GEF programme. *These important links will increase the likelihood of the project having regional policy-level outcomes, and also increase the likelihood that countries will seek support for follow-on activities based on the model of the GEF project.*

Project Components /Activities and Expected Results

49. The characterization of components of the project (*i.e.*, their design, objectives, activities and expected results) has been carried out with the representatives of the several participating countries during synthesis and planning workshops. The synthesis workshops were based on country proposals and the PDF-B results allowed joint definition of the goals, activities, expected results and progress indicators. During the PDF-B, country working groups were convened and national consultants hired to provide detailed background information on the countries, and particularly agroecological information for the sites proposed in the full project. These reports are available (in French) and on file with FAO. Annex G provides site listings, maps and some agricultural cropping information. The project comprises five components, namely:
    - Awareness Raising and Establishing Baselines;
    - Assessments of Freshwater Contaminants;
    - Developing Best Practices;
    - Developing Community Networks;
    - Project Coordination and Management.

Component I: Awareness Raising and Establishing Baselines

50. *Objectives*: Stakeholder awareness is raised through establishment of baselines and development of partnerships with government structures (including Extension and Crop Protection departments within the Ministries of Agriculture, and appropriate parastatal agricultural entities such as SAED), NGOs and Farmer Organizations (FOs) at local, national and sub-regional levels

    Expected outcomes include:
    - Appropriate government structures, NGOs and Farmers Organizations fully engaged in conducting participatory training for farmers in sustainable best practices by 2012;
    - Overall picture of riverine contaminant levels, types and data on farmer pesticide practices provided by project feedback to regional pesticide regulation structures (CILSS CSP and CPH/AOC) ;

- Baselines established for 30 communities (clusters of villages sharing the same water resources) and results discussed. Data serves also as baseline for evaluation of project outcomes at mid-term and end of project (M&E);
- National policy studies completed by the mid-term report and serve to generate at least two policy recommendations in the four countries for which studies do not yet exist.

To this end activities will be organized as follows:

a) Conduct consultation and planning meetings at all levels:
    i. Conduct first sub-regional planning meeting with sub-regional Technical Steering Committee (RTSC) to review details of project start-up plan;
    ii. Conduct 6 National TSC meetings;
    iii. Conduct site visits to meet with local governments, communities and other local stakeholders to inform them of the project;
b) Meet with CILSS CSP and CPH/AOC structures to discuss information exchanges
c) Conduct baseline community surveys at 5 project sites in 6 countries:
    i. Establish survey partners with local appropriate community-based organizations and seek community members to participate as additional surveyors ;
    ii. Conduct joint training for survey and agree on survey form and content;
    iii. Conduct survey and compile results;
    iv. Conduct water sampling tests in collaboration with Locustox and ENDA;
    v. Bring overall results back to the communities for review and validation.
d) National policy studies completed and national workshops held to discuss outcomes:
    i. Determine and hire local and international consultants to carry out studies;
    ii. Develop TOR for study;
    iii. Present and modify study TOR with National Technical Steering Committee (NTSC);
    iv. Consultants to carry out policy study;
    v. Study finalized and presented to NTSC and pesticide policy working group (PPWG);
    vi. PPWG formulates and presents brief set of policy recommendations to the governments, using study as supporting document

<u>Component 2: Assessments of Freshwater Contaminants</u>

51. *Objectives*: Stakeholders gain a clear picture of issues and threats related to pesticide contaminant loads in rivers, irrigation and drainage systems, through analysis of water samples from target sites.

Expected outcomes include:

- A clear picture of contaminant levels along the Senegal and Niger rivers provided by water samples in at least 30 locations in six countries;
- Overall project progress and outcomes provided to governments and others from project database including geo-referenced data (GIS) ;
- Relative risks to farmers and aquatic environment from exposure to pesticides estimated from at least three simple empirically based modeling approaches;
- Novel curriculum suitable for use in Farmer Field Schools in sub-region and beyond derived from contaminant analysis and modeling efforts;

To this end activities will be organized as follows:

a) A subset of community sites already identified by NTSCs will be further characterized for monitoring contamination in the Niger and Senegal Basins:
    i. Sampling plans will be devised together with NCUs, RCU, FAO and CERES/Locustox staff;
    ii. Sampling consultant will visit general target areas to meet with appropriate government services to gather water-flow and chemical-use data;
    iii. NCU and consultant presents sampling plan to NTSC for approval;
b) National teams will be trained on sampling methods by CERES/Locustox staff members in country-level workshops;
c) Water samples taken and analyzed in CERES/Locustox laboratory:
    i. Samples taken from field, conserved and sent do CERES/Locustox;
    ii. Samples analyzed and results entered into project database;
d) At least three simple empirically based modeling approaches explored as means to estimate relative risks to farmers and aquatic biota using results from sample survey
e) Results translated into curriculum suitable for use in Farmer Field Schools for discussion of risks to humans and threats to ecosystems;

Component 3: Developing Best Practices

52. *Objectives*: Toxic pesticide use is drastically curtailed, POPs pesticide-use is eliminated, and agricultural productivity and profitability are substantially increased through participatory training and adoption of Best Practices for agriculture. Community-level pesticide-monitoring systems in place and examples of successful self-financed FFS seen in each country.

Expected outcomes include:

- Farmer Field School curricula expanded to include modules on ecosystem services, ecological functioning, community-based mapping and contamination risks to hydrological systems and aquatic environments, SRI and irrigated aquaculture by 2012;
- Regional capacity for participatory training augmented by total of 150 “technician” trainers and 300 farmer trainers by 2012;
- Lessons learned and curriculum developed during the course of the project shared across all six countries by 2012;
- Substantial participation by women in FFS assured: at least 50% in market gardening, 30% in rice and 20% in cotton by 2012;
- Community-based monitoring systems for pesticide use developed and used by all 30 target communities by 2012.
- Successful examples of self-financed FFS (3 per country) established in each country by 2012 and at least two new FFS conducted by local farmer-facilitators in neighbouring communities by 2012.

To this end activities will be organized as follows:

a) Hold first regional curriculum-development workshop:
    i. Present and review existing curricula for the sub-region;
    ii. Create subject-matter sub-groups to address each of the following new topics:
        - *Pesticide toxicity to humans and the aquatic environment*;

- *Economic implications of pesticide use;*
- *System of Rice Intensification (SRI);*
- *Irrigated Aquaculture;*
- *Water-borne and vector-borne Diseases;*
- *Locust biology, Ecology and non-toxic crop protection methods*
- *Development of Community-based Pesticide-monitoring system*

b) Conduct two full-season "Training-of-Trainers" (TOT) programmes in year one for participants from each country, for rice (Mali) and for vegetables (Senegal);
c) Conduct three full-season TOT programmes in year two for participants from each country, for rice (Mali), for cotton (Mali) and one for vegetables (Senegal);
d) Conduct Farmer Field Schools in each country;
e) Develop with target communities, through FFS alumni and village leaders, monitoring systems for pesticide used;
f) Conduct second curriculum development workshop in year 3 to share lessons learned and curriculum developed during the first two years of the project;

Component 4: Developing Community Networks

53. *Objectives*: Communities sharing the same river-basin hydrological resources communicate the results of Best Practices and contaminant reduction activities through inter-community communication and exchange networks.

Expected outcomes include:

- Communities disseminate experiences and knowledge gained during project to neighbouring communities in the form of at least one "open door" (inter-community meeting) per location;
- Networks of IPPM farmer facilitators maintain quality and timeliness of information to farmers through exchanges at local, provincial, national and subregional levels.

To this end activities will be organized as follows:

a) Develop networks among villages in the same water-use areas (same, shared river, irrigation and drainage systems):
    i. Conduct "Open door" days at the end of each FFS, in which neighbouring communities are invited to witness and discuss outcomes of FFS training, including the nature of toxic risks from pesticides, the existence and increased benefits from alternative methods, and establishment of community-based monitoring systems;
    ii. Farmer-Trainers (FT) to work with Technician-Trainers (TT) in neighbouring villages in new FFS aimed at expanding scope of training to eventually include entirety of water-use area;
    iii. Annual "Open door" meetings to be held at larger administrative levels for benefit of prefecture and department-level local government and communities;
    iv. Representatives elected from target water-use areas meet to discuss possible outcomes of project on larger scales of the river basin;
    v. Some cross-country based exchanges, depending on strategic analysis of greatest likely outcome (most likely in cotton sector)
b) Develop networks among facilitators at local, provincial and regional levels
    i. Local workshops held at each level, beginning with the local levels, with representatives chosen to attend workshops next level up;
    ii. Newsletter developed for benefit of facilitators and farming communities

Component 5: Project Coordination and Management

54. *Objectives*: Institutional capacity established to co-ordinate regional interventions, monitor project impacts, and disseminate and exchange information.

Activities will be organized as follows:

a) The Headquarters-based Chief Technical Advisor (CTA) will organize the creation of a Regional Coordination Unit (RCU) to be set up in the sub-region. The RCU will comprise at least a Regional Project Coordinator (RPC), a Regional Data Management Administrator, a Knowledge Management Consultant (part time) and a secretary and will be equipped with appropriate communications and document preparation facilities. In addition, each country will establish a National Project Coordination Unit (NPCU). National Project Coordinators (NPC) will be chosen in the countries by FAO. Semi-annual meetings among the CTA, RPC and the NPCs will be held. One of these meetings, each year, will take place immediately prior to the meetings of the Regional Technical Steering Committee (RTSC) as a means of preparing up-to-date synopses of information for presentation to the RTSC. Annual regional meetings for activity assessment and planning will also be convened involving a wider range of participants from the countries involved in the project. These latter meetings will be arranged to take place prior to individual regional consultation meetings among the national and regional project coordinators;

b) Six National Project Steering Committees (NTSC) will be set up at the beginning of the project comprising a membership to be decided by each country's lead ministry (which may vary among countries);

c) A Regional Technical Steering Committee (RTSC) will be set up at the beginning of the project comprising a representative each from UNEP, FAO, the participating countries' NTSC and possibly relevant regional Agencies. The RTSC will be chaired on a rotating basis by the member countries; a representative of FAO will serve as Executive Secretary and the project coordinator will attend in an ex-officio capacity (see Annex K for details on overall and national coordinating structures;

d) The RTSC will first meet immediately following completion of the appraisal phase and signatures of the GEF CEO, to act as technical and policy advisor to the project and to assist in any required agreements and arrangements for project execution. The RTSC will subsequently meet one time per year including what will be termed the inception workshop, to be held within 2 months subsequent to project start-up, a mid-term meeting and a meeting to be held 3-6 months prior to project completion. At the mid-term meeting, project and component progress will be reviewed, any delays or outstanding difficulties will be discussed and resolved, and forward planning for the subsequent period of project execution will be undertaken. The independent mid-term evaluation commissioned by UNEP in collaboration with FAO will also be reviewed during this meeting. The final RTSC meeting will check to see that all deliverables are completed and that arrangements have been made for sustaining of major consultative and informational components created by the project;

e) The Project Coordination Units will maintain records of project activities and project expenditures at the national, regional and Headquarters levels. Such records will be made

available to the executing and implementing agency representatives on request. The project workplan and timetable is presented in Annex H.

Risks and Sustainability

Risks

55. The Logframe matrix presented in Annex B lists project-related risks and assumptions. The primary assumption that has a low probability of not being met is that of economic and social stability in the global circumstances and in the region. It is unlikely that major global disruptions in either of these areas will occur over the 4-year life of the project although there exists, as always, the risk of political disruption or conflict somewhere in the sub-region that could adversely affect project execution. A further assumption is that outbreaks of migratory pests (locusts) in the region do not undermine the political will of the countries to move forward with programs aimed at drastically reducing pesticide use. Since the completion of the PDF-B phase activities in Senegal, a major locust outbreak has taken place, and looks to be close to completing its cycle. One outcome has been a rough doubling of the amount of pesticides coming into several riverine regions, including the Senegal River. Although these chemicals are in a formulation (ULV) unsuitable and highly dangerous for use by farmers, it is assumed a certain proportion of the chemicals will find their way into the hands of farmers through back-channel markets. A final assumption is that global climate change will not adversely affect project execution. The project execution and expected outputs are at no real risk from climate change, but on the contrary, the project has several elements that will be a positive contribution to both climate change mitigation and adaptation. The anticipated reduction in the use of agrochemicals will play a direct role in reducing greenhouse gases as substantial greenhouse gases are released during both the production and use of fertilizers and pesticides (mitigation). Furthermore, reducing toxic substances and fragile aquatic systems will help remove one additional source of stress in ecosystems increasingly stressed by climate change.

56. A substantial proportion of the assured co-financing by governments is derived from the re-allocation of existing staff and recurrent budgets of the involved ministries and government departments to project activities. Nevertheless, the demands on these same government departments made by other commitments to initiatives in the sub-region required pursuant to international agreements are significant and this project probably represents a minor incremental demand that is unlikely to present a major burden to the participating governments. Any risk of excessive demand on government departments should be adequately compensated for by increased recognition of the value of such international commitments within the countries concerned.

Sustainability

57. Permanent long-term reduction in the use of the most toxic chemicals is a function of three factors: i) adoption of “Better practices” by farmers exposed to the IPPM training, ii) institutionalization of the IPPM training approach within the appropriate national structures, and iii) policy developments that recognize the real costs and benefits of pesticide use in the developing country context. Experience with IPPM in more than 20 countries overwhelmingly demonstrates that adoption of “better practices” (improved soil, water, seeds and pest management) and including reduction or elimination of pesticides in the major tropical agriculture systems (rice, vegetables, cotton) results on average in perceived increases in yields, income and environmental and health benefits. This lack of “trade offs” with pesticide reduction suggests a clear “win-win” scenario for participating farmers. The evidence supports the logic that farmers experiencing these benefits of an IPPM approach tend not to return to “old habits”.

58. The project aims to actively involve a range of stakeholders, including regional structures, government agencies, NGOs, farmer organizations and individual communities. The project presents five major activities for which sustainability reasonably needs to be addressed: (i) maintenance by the target communities of introduced, alternative agricultural production models, (ii) community-based monitoring for pesticides, (iii) institutionalization of the participatory educational approach (Farmer Field Schools or similar approaches), (iv) national monitoring capabilities for water quality, and (v) development of communications networks.

59. The project will forge strong linkages with key national, regional and international agencies as part of the awareness-raising component. Discussions with the two regional partners involved in pesticide legislation (Comité Sahelien des Pesticides and Comité Phytosanitaire des Pays de la zone Humide de l'Afrique de l'Ouest et du Centre) indicated clearly that the countries lack is a means of monitoring the reality of pesticide use at the field level. They therefore strongly support the project goals related to water-quality monitoring and community-based pesticide management, as these efforts, besides providing local benefit, will provide "feed-back" from the field that will support further policy initiatives.

60. *Maintenance by the target communities of introduced, alternative agricultural production models*. Experience in S.E. Asia with similar community-based approaches suggests that *in cropping systems where there is a clear economic incentive for change, farmers tend to adopt, maintain and disseminate new methods.* Experience during the PDF-B and especially during the Phase I IPPM/FFS project demonstrates clear and unequivocal economic benefits in terms of yield increases and lowered input costs (for pesticides) in all three cropping systems. Although yet to be evaluated, the GEF interventions will have the added motivating factor of heightened awareness by farming communities of the negative externalities associated with chemical pesticide use. Furthermore, by helping to develop networks of facilitators and communication among neighbouring communities, and by helping communities learn to take advantage of the opportunities presented by the newly decentralized agricultural service providers, the project will set the stage for continued development and expansion of alternative agricultural models. The Monitoring and Evaluation Plan will evaluate adoption of alternative production methods towards the end of the project, looking back to communities in which the alternative methods were introduced three-to-four years earlier. Spread (replicability) to neighbouring communities will also be evaluated at this time, based on methods currently being developed in the IPPM/FFS program in collaboration with the Department of Agricultural Economics at the University of Hanover, Germany.

61. *Community-based monitoring system for pesticides*. This is an entirely new concept for which no prior data on adoption rates exist. Logically, if the communities find both value in and social acceptance of the methods, with little or no cost, then they should be maintained by the community. If time brings major shifts away from the current use of large quantities of highly toxic pest control materials, then presumably the monitoring system will no longer be necessary. Expansion of these methods along with improved agronomic methods will be contingent on their demonstrated value to the communities. The community-based monitoring will work to feed back to national and regional levels and thereby provide information that can help change policies (e.g., border checks for illegal chemicals).

62. *Institutionalization of the participatory educational approach (Farmer Field Schools or similar approaches)*. The trend over the past 20 years in development projects has been toward the increased adoption of participatory, non-formal or "adult education" methods as part of a larger trend towards "adaptive management" and it is likely this trend will persist into the foreseeable future. Evidence for adoption of this approach is clearly seen in Mali and Burkina Faso resulting from the Netherlands co-financing project. In this context the project will help to foster a culture of experimentation, learning

and sharing among farming communities so that they will continue to develop methods that are environmentally and economically most appropriate to their specific farming-systems and continue to share and take advantage from lessons learned elsewhere. In this way the project will contribute to a growing social movement that continues to bring substantial benefits to the communities and the countries involved. The project is constructed in such a manner that lessons learned will continue to feed back into the project countries and be shared on a global level after the end of the project. Specific elements to support this longer-term sustainability include:

a) *Self-financed Farmer Field Schools* (see full details in Annex L). The IPPM/FFS programs in East Africa developed the first models anywhere for self-financed FFS. These models have evolved there which will be applied to the West African context in this GEF project. Several models have evolved. In both cases a high-value commercial crop is either the subject of the FFS, or is grown in conjunction with the FFS. In the "semi self-financed" model, farmers begin with a grant to the farmers' group, which uses the money to establish an FFS with associated cash crop. The proceeds from the harvest go into the farmers' organization to help fund future studies, or in other ways to benefit the group. In the "self-financed FFS" model, the proceeds from the harvest go to repay an initial loan, with the remainder going to benefit the group. *In both cases, the training process has the potential for greater accountability in that farmers groups are in a position to hire or fire the facilitator, based on performance.*

b) *Institutionalization at the Farmer Organization level*. Experience elsewhere in the world and in the IPPM/FFS programme shows Farmer Organizations to be one of the most promising avenues for institutionalizing the FFS approach. The current move to decentralize and semi-privatize agricultural support services sets the stage for empowerment of FOs and the development of self-financed FFS.

c) *Adoption by government structures*. While government agencies are often the least responsive to change, some encouraging signs are evident. In Mali the World Bank funded PNIR project has specific instructions and has budgeted line items such that any new development of small-scale rice schemes must be accompanied by development of Farmer Field Schools for the scheme. Also note that during the final validation workshop (Bamako, March 7-8 2005) the six participating countries indicated that if the participatory extension approach tested during the GEF project were to prove successful, the governments would be favourably inclined towards further efforts to institutionalize the approach more broadly within state and parastatal structures.

63. *National monitoring capabilities for water quality*. The facilities of CERES/Locustox provide the only certified laboratory facility in the sub-region capable of processing the estimated quantity of samples, and having the requisite analytical reliability. While this will be suitable for the short-term project goals, a longer-term solution will require eventual development of equivalent capabilities in some or all of the partner countries. The project will seek political support to have results from the project incorporated into National Strategies and Action Plans for development of improved national water-quality monitoring programmes. Of course seeking support for future actions is contingent on the outcomes of the project. If little or no contaminant pollution is found in national waterways (certainly not the case for Senegal as determined during the PDF-B), then little incentive will exist.

64. *Development of communications networks.* The setting up of IPPM trainers' networks is already under way in Mali and Senegal under the IPPM/FFS programme. Its expansion throughout the sub-region will permit updating of knowledge and maintain quality and innovation through knowledge

exchange among partners. Similar networks in S.E. Asia have survived the end of their parent projects. The setting up of an agricultural producer facilitation network similarly will provide new and updated tools to the producers. Training farmers as trainers (estimated to be 300 farmer-facilitators by the end of the project) will also help ensure post-project sustainability.

Replicability

65. ***Local***: As discussed under sustainability, experience with IPPM demonstrates clear and unequivocal economic benefits in terms of yield increases and lowered input costs (for pesticides) in all three cropping systems. This, coupled with the added motivating factor of heightened awareness by farming communities of the negative externalities associated with chemical pesticide use, will provide the overall motivation for replication or diffusion of the project activities. The project will have trained some 150 government and NGO facilitators and 300 Farmer-facilitators, who will be capable of training farmers in other communities. Networks of facilitators will help ensure spread of lessons learned and newly developed curricula.

66. ***National:*** National restructuring of traditional extension services with support for semi-privatized agricultural support services, as described earlier, offers an excellent opportunity for both sustainability and replication of the GEF project activities, including those related to supporting new Farmer Field Schools and possibly supporting semi-self financed or self-financed FFS (see Annex L). Already functioning FFS will be in a much better position to take advantage of newly reorganized agricultural support structures and associated sources of funding, by more effectively being able to diagnose community needs and to put forward coherent proposals for activities. The training-of-trainers component of the project also helps assure human resource capacity at a national level.

67. ***International:*** Increasing demand for a Farmer Field School approach is seen in the sub-region (Togo, Cameroon, Gambia), elsewhere on the African continent (North, East and Central Africa, Madagascar and the Western Indian Ocean) and elsewhere in developing regions of the world (some 35 countries have already implemented some form of IPPM/FFS programme). This demonstrates a strong potential for replication at an international level. The results from this project, in terms of lessons learned, curricula and human-resource capacity developed, will promote replicability at an international level.

STAKEHOLDER PARTICIPATION AND IMPLEMENTATION ARRANGEMENTS

68. During the PDF-B phase, the characterization of full project activities, their planning and implementation were conducted in collaboration with government (SAED and CERES/Locustox foundation), NGO (ENDA Tiers Monde), and in the field with each of the pilot communities through a multidisciplinary and participatory process. The regional document was prepared through the following process: i) information and raising awareness of authorities in the various targeted countries; ii) establishment of country working groups comprising representatives of the government, civil society and the national GEF and POPs focal points; iii) production of in-depth country reports by national consultants working with the national coordination structures, providing background information on the river and irrigation systems, on the populations and cropping systems in the target sites and on the status of pesticide use in the country (reports, in French, on file with FAO); iv) the submission of proposals for discussion, synthesis and planning for incorporation into a regional programme document during a workshop held in Dakar, 4–6 March, 2004, that involved participation by two designated representatives from each country; v) the write up of the full project brief and vi) the final validation of the full-project brief and endorsement by the countries in a final validation workshop (Bamako, 7-8 March, 2005).

69. The full project is based on the continuous participatory diagnosis related to the various biological, economic and social drivers, pressures and states of the community environment (Annex J). Once the project is under way, local problem identification and system characterization will be done by the populations themselves, with guidance from the project, national and regional partners. The local populations and Farmer Organizations are the main beneficiary of the project activities, but national-level partners, including state and parastatal agricultural services and NGOs will also benefit in terms of gaining experience in participatory approaches and first-time assessments of water quality in the two major rivers and associated irrigation systems. The regional CILSS CSP and CPH/AOC pesticide legislation process will benefit from feedback from the national-level water-quality assessments and community-based pesticide monitoring work.

70. The active participation of the communities is central to the method, and leads to a number of benefits, including the improvement of local knowledge and skills, rapid feedback to partner agencies and pragmatic evaluation of the relevance of research and development of methods appropriate to local circumstances. Furthermore, active involvement from the beginning by communities ensures the topics and the system of evaluation reflect local concerns. Participation and discussion encourage understanding and help lead to empowerment, and promote greater widespread acceptance and adoption of results. The involvement of populations in the choice, implementation and follow-up of study themes promotes the interest of local populations and an understanding of the modalities and benefits of their execution. The more that grassroots communities are involved, the more they understand and are motivated thereby increasing the probabilities of success. Finally, the participation of populations in practical field studies promotes the building of capacity for future investigative work.

71. This regional project will develop partnerships with several different government and NGO-based institutions involved in pesticides and pesticide management, including ecotoxicology laboratories in the sub-region (Locustox, Dakar, Laboratoire Central Veterinaire de Bamako), the six national departments of crop protection, the six ministries of agriculture and environment, AGRHYMET[8], various NGOs (e.g., PAN Africa, ENDA-Pronat) and the regional CILSS CPS (for Mali, Mauritania, Senegal and Niger) and CPH/AOC (for Benin and Guinea). *Farmer communities in the basins of the Senegal and Niger Rivers are the main partners and the beneficiaries of the project.*

72. One of the primary project strategies will be the creation and strengthening of local competence in the management and monitoring of pesticide use and identifying and testing sustainable and cost-effective alternatives. In this context, emphasis will be placed on civil society participation through the medium of local NGOs working with grassroots organisations, including local Farmer Organizations.

73. ENDA Tiers Monde specializes in informal training and participatory approaches. In recognition of the important role this NGO is playing in the field of information dissemination, raising awareness and training in the sub-region communities searching for alternatives to chemical pest control and the

[8] AGRHYMET is a special institution of the Comité Permanent Inter Etats de Lutte contre la Sécheresse au Sahel, or CILSS. Its goals are to increase food security by providing tools to help maximize agricultural production in the CILSS member states (Burkina Faso, Cape Verde, Chad, the Gambia, Guinea-Bissau, **Mali**, **Mauretania**, **Niger**, and **Senegal**), and improve natural resources management within the overall Sahel region. Founded in 1974, AGRHYMET collects and disseminates both raw data and a variety of finished information products relating to environmental monitoring and food security in the Sahel. It also acts as a center for capacity building, providing both long-term, degree-level training and short-term training courses in topics such as agrometeorology and hydrology.

improvement of economic conditions, ENDA will be one of the key partners in the implementation of the project. CERES/LOCUSTOX, a unique certified laboratory, specialized in ecotoxicological research in the Sahel, will provide its support in the field of scientific research and biological and chemical analysis. Other NGOs and local research centres will become involved as the project unfolds.

INCREMENTAL COST AND PROJECT FINANCING

74. Table 2 presents an incremental cost table based on the component costs presented in Table 3 and the more detailed analysis contained in Annex A. As noted in that Annex, benefits under this project accrue at the global, regional and national levels. Direct environmental benefits that accrue as a consequence of project activities will be largely national and regional although educational outputs in terms of curriculum development will likely be spread globally within a short time. Also, the overall contribution to POPs reductions in the environment provides global benefits consistent with the aspirations of the Stockholm Convention. Considerable environmental benefits are anticipated to arise through the adoption of alternative farming practices in the Niger and Senegal River basins. These should be both measurable and quantifiable in economic terms by both local populations and national governments.

75. Adopting a regional approach to concerted action carries with it transaction costs associated with networking local and prefectural institutions and the national governments. While not all of these costs are strictly incremental, since national benefits derive from sharing of regional experiences, it is certainly the case that without a GEF intervention such costs will not be met since they result in little direct national benefit. The countries of the region are clearly committed to a regional approach as evidenced by their commitment to the PDF-B process. The costs of actions that result in direct national benefit are predominantly those that build capacity at the local, prefectural and national levels.

76. Table 3 presents the project budget and component financing. The total cost of the project (including the PDF-B phase) is $9,305,340 of which $999,683 is the anticipated costs to the governments in cash and in kind. Of the overall sum, FAO and its programmes will contribute both in the form of cash and in-kind, an amount of $3,458,477, of which $2,800,000 is redirected baseline from the Netherlands-funded FAO IPPM project and $267,000 is redirected baseline from the Swedish-funded environmental impacts of locust control project. The project funding requested from the GEF is $4,105,330. This excludes GEF support for the PDF-B that amounted to $372,500.

Table 2
Baseline and Incremental Costs

	Baseline	**Alternate**	**Increment**
	US $	**US $**	**US $**
Global Environmental Benefits	98,922,000	108,227,340	9,305,340
PDF-B Phase		741,850	741,850
Component 1 - Awareness Raising and Establishing Baselines	16,126,000	17,638,006	1,512,006
Component 2 - Assessments of Freshwater Contaminants	1,096,000	3,342,248	2,246,248
Component 3 - Developing Best Practices	79,200,000	81,926,005	2,726,005
Component 4 - Developing Community Networks	2,400,000	3,532,005	1,132,005
Component 5 - Project Coordination and Management	100,000	1,047,225	947,225

Table 3
Project Budget Summary and Component Financing in US $

			Co-financing				Grand
Project Activities	GEF	% GEF	Governments	Other Sources	Total co-fi	% co-fi	Total
Component 1 - Awareness Raising and Establishing Baselines	805,076	53.2%	250,000	456,930	706,930	46.8%	1,512,006
Component 2 - Assessments of Freshwater Contaminants	1,140,269	50.8%	100,000	1,005,980	1,105,980	49.2%	2,246,248
Component 3 - Developing Best Practices	1,265,566	46.4%	250,000	1,210,440	1,460,440	53.6%	2,726,005
Component 4 - Developing Community Networks	505,076	44.6%	250,000	376,929	626,929	55.4%	1,132,005
Component 5 - Project Coordination and Management	389,344	41.1%	149,683.0	408,198.4	557,881.4	58.9%	947,225
Project Total	4,105,330	47.9%	999,683	3,458,477	4,458,160	52.1%	8,563,490

MONITORING, EVALUATION AND DISSEMINATION

77. The monitoring and evaluation plan (M&E Annex I) maps the approach for measuring and verifying that activities and outcomes described in the project logframe and timeline are being met. The M&E Plan follows UNEP guidelines and incorporates UNEP monitoring activities.

78. There are four entities with roles to play in the Monitoring and Evaluation process:
    - UNEP will receive from the FAO Technical Coordination Unit (TCU) six-month progress and quarterly financial reports. UNEP will also serve as a member of the Regional Technical Steering Committee (RTSC). FAO, as the Executing Agency, will also be represented on the Technical Steering Committee and FAO officers will make field visits to assess progress and problems (as needed and agreed with the RPCU and RTSC). UNEP and FAO will jointly appoint independent evaluators for the conduct of mid-term and final project evaluations.
    - The TCU will develop a reporting structure for all project partners and ensure that reporting is timely and complete. It will develop all reports for UNEP and carry out regular site visits, together with the RCU, with particular attention to project sites or activities experiencing difficulties or suffering delays.
    - The RTSC will review all reports, advise the RPCU on resolving difficulties and increasing efficiency, and monitor progress in all components of the project at annual meetings.
    - The RTSC and NTSC will review all reports and offer policy guidance. They will play a key role in facilitating linkages, both in their respective countries and between countries, and will seek appropriate policy outcomes based on project results.

79. Project monitoring is of two types: monitoring of performance in project execution; and monitoring of satisfaction of outputs and milestones.

80. Monitoring of performance in project execution includes evaluation of the efficiency and effectiveness of project management. It also tracks overall project progress and financial

accountability. This aspect of monitoring will be carried out by FAO in cooperation with UNEP and reports will be provided to the Technical Steering Committee for review.

81. Monitoring of project outputs or milestones evaluates the rate of progress in project execution. It is based on the indicators and means of verification specified in the logical framework (or logframe) matrix (Annex B) and the Monitoring and Evaluation Plan. Half-yearly progress reports will include assessments of all outputs that were to be completed within that specific timeframe. Outputs not completed within the planned timeframe will be noted, the reasons for delay specified and the anticipated date of completion indicated for further tracking purposes.

82. The Regional Project Coordinator will be responsible for developing quarterly progress and financial reports with inputs from national management units. These reports will be important monitoring tools, as they will be carefully tracked by both the implementing and executing agencies, the national coordinators and, ultimately, the PSC during annual meetings.

83. Participation of all stakeholders is fundamental to this project. Stakeholder participation in the monitoring and evaluation process is also essential to ensure continued ownership of project activities. Not only are the stakeholders legitimate participants in the process of monitoring and evaluation but they are often the best positioned to understand the reasons for successes and failures. Farmers and other stakeholders will therefore be included in the evaluation process at the local level and will be involved in internal project evaluations and annual reviews of project performance. Mid-term and final evaluation will be conducted by independent evaluators contracted by UNEP.

84. Local evaluations will also be undertaken to underpin the monitoring and evaluation process. These will include an internal self-evaluation undertaken by farmers themselves in consultation with technical experts. It will be carried out during workshops and meetings where farmers will be able to assess their experience and skills and participate in analysis and finding solutions to problems. The process will be disseminated in the form of publications.

85. Government agency representatives serving on the RPSC will be best positioned to understand the challenges and appropriate strategies for influencing national policy priorities. The monitoring process will highlight tactics that are successful or not, motivating factors for project stakeholders, and, as the project progresses, the extent to which project activities are achieving success. These lessons will be summarized in reports for presentation at workshops in the sub-region and for presentation to the PSC. Planning in the final stages of project execution will include mechanisms to ensure that project findings are distributed as widely as possible in order to maximize influence on the agriculture sector.

86. Reporting will be a continuous activity. It will be carried out at country level by the range of stakeholders involved in project activities (coordinators, technicians, farmer facilitators) and at the regional level by the project coordinator who will submit biannual activity reports that will be transmitted to FAO and UNEP.

SECTION 3 - WORKPLAN AND TIMETABLE, BUDGET, FOLLOW-UP

3.1 Workplan and Timetable

A detailed Work-Plan is provided in Annex H.

3.2 Budget

A detailed budget in UNEP format is presented in Annex U. This budget is based upon the GEF approved budget provided in the Full-size Project Brief

3.3 Follow-up

There will be excellent opportunities for replication of lessons learned to other countries in the region and beyond by the execution of the Full-Sized UNEP/GEF Project.

SECTION 4 - INSTITUTIONAL FRAMEWORK AND EVALUATION

4.1 Institutional Framework

FAO, as the Executing Agency, will be responsible for the implementation of the project in accordance with the objectives and activities outlined in Section 2 of this document. UNEP, as the GEF Implementing Agency, will be responsible for overall project supervision to ensure consistency with GEF and UNEP policies and procedures, and will provide guidance on linkages with related UNEP and GEF-funded activities. The UNEP/DGEF Co-ordination will monitor implementation of the activities undertaken during the execution of the project. The UNEP/DGEF Co-ordination will be responsible for clearance and transmission of financial and progress reports to the Global Environment Facility.

FAO, as executing agency, will cooperate with UNEP so as to allow the organization to fulfill its responsibility as Implementing Agency accountable to the GEF. To this end, free access to all relevant information will be provided by FAO.

All correspondence regarding substantive and technical matters should be addressed to:

At FAO
William Settle
Biodiversity and Ecosystems Officer
FAO/ AGPP
Tel: +3906-570-56039
Fax: +3906-570-56229
E-mail: william.settle@fao.org

At UNEP
Takehiro Nakamura,
Acting Senior Programme Officer,
International Waters
UNEP/ Division of GEF Coordination,
P.O. Box 30552, 00100 Nairobi, Kenya.
Tel.: +254-20-7623886
Fax: +254-20-7623162

All correspondence regarding financial matters should be addressed to:

At FAO
Joe Fong
Finance Officer
FAO/ AFFC
Tel: +39 06-570-56556

Fax: +39 06 570 56023
E-mail: joe.fong@fao.org

With a copy to:

William Settle
Biodiversity and Ecosystems Officer
FAO/ AGPP
Tel: +3906-570-56039
Fax: +3906-570-56229
E-mail: william.settle@fao.org

At UNEP
D. Hastie, Chief,
Budget and Financial Management Service (BFMS),
UNON,
P.O. Box 30552
Nairobi, Kenya.
Tel: (254) 20 7623821
Fax: (254) 20 7623755

With a copy to:

Sandeep Bhambra,
Fund Management Officer,
UNEP /DGEF Co-ordination,
P.O.Box 30552
Nairobi, Kenya.
Tel: 254-20-7623347
Fax: 254-20-7623162
Email: Sandeep.Bhambra@unep.org

Project administrative and Operational matters should be addressed to FAO, William Settle as per contact information above:

4.2 Final Evaluation

UNEP will organise both a mid-term and final independent evaluation of the project to measure the degree to which the objectives of the project have been achieved.

SECTION 5 - MONITORING AND REPORTING

5.1 Management Reports

5.1.1 Progress Reports

Within 30 days of the end of the reporting period, FAO will submit to UNEP, with a copy to Division of GEF Coordination, using the format given in Annex M, half-yearly progress reports as at 30 June and 31 December.

5.1.2 Terminal Reports

Within 60 days of the completion of the project, FAO will submit to UNEP, with a copy to UNEP/DGEF Coordination, a Terminal Report detailing the activities taken under the project, lessons learned and any recommendations to improve the efficiency of similar activities in the future, using the format provided in Annex P.

5.1.3 Substantive Reports

(i) At the appropriate time, FAO will submit to UNEP in draft any manuscript for publications and, at the same time, inform UNEP of plans for its publication. UNEP will give FAO substantive clearance of the manuscript, indicating any suggestions for change and such wording (recognition, disclaimer, etc.) as it would wish to see figure in the preliminary pages or in the introductory texts.

(ii) It will equally consider the publishing proposal of FAO and will make comments thereon as advisable. It may request FAO to consider publication on a joint imprint basis. Should FAO be solely responsible for publishing arrangements, UNEP will, nevertheless, receive 10 free copies of the published work in each of the agreed languages, for its own purposes.

5.2 Financial and Co-financing Reports

5.2.1 Financial Reports

FAO shall submit to UNEP quarterly project expenditure accounts and final accounts for the project, showing amount budgeted for the year, amount expended since the beginning of the year, and, separately, the unliquidated obligations as follows:

(i) Details of project expenditures on an activity-by-activity basis, reported in line with project budget codes as set out in the project document, as at 31 March, 30 June, 30 September and 31 December each year, providing details of unliquidated obligations separately (see formats in Annex O. The expenditure accounts will be dispatched to UNEP within 30 days after the end of the quarter to which they refer.

(ii) The expenditure account as at 31 December is to be received by UNEP by 15 February each year.

(iii) A final statement of account, in line with UNEP project budget codes, reflecting actual final expenditures under the project, when all obligations have been liquidated.

5.2.2 Co-financing Reports

Within 60 days of the reporting period, FAO shall submit to UNEP GEF Coordination Office, a yearly co-financing report for the project using the format provided in Annex V showing information FAO has received on:

(i) Amount of co-financing realized compared to the amount of co-financing committed to at the time of project approval, and

(ii) Co-financing reporting by source and by type.

(a) Sources include the agency's own co-financing, government co-finance (counterpart commitments), and contributions mobilized for the project from other multilateral agencies, bilateral development cooperation agencies, NGOs, the private sector, and beneficiaries.

(b) Types of co-finance. Cash includes grants, loans, credits and equity investments. In-kind resources are required to be:

- dedicated uniquely to the GEF project,
- valued as the lesser of the cost and the market value of the required inputs they provide for the project, and
- monitored with documentation available for any evaluation or project audit undertaken by FAO.

With regard to reporting on in kind co-financing provided by government and other institutions, FAO will encourage the partners to provide the information in a timely manner and will transmit such information to UNEP as received and without certification.

5.3 Terms and Conditions

5.3.1 Non expendable equipment

FAO will maintain records of non-expendable equipment (items costing US$500 or more as well as attractive items such as pocket calculators, cameras, computers, printers, etc.) purchased with UNEP funds (or with trust funds or counterpart funds administered by UNEP). FAO will submit an inventory of such equipment to UNEP, indicating description, serial no. (where applicable), date of purchase, original cost, condition, location of each item attached to the half yearly progress reports, including all the information shown in Annex Q.

Within 60 days of completion of the project, FAO will submit to UNEP a final inventory of all non-expendable equipment purchased under the project indicating description, serial number (where applicable), original cost, condition, location and a proposal for the disposal of the said equipment. Non-expendable equipment purchased with funds administered by UNEP remains the property of UNEP until its disposal is authorized by UNEP, in consultation with FAO. The proceeds from the sale of equipment (duly authorized by UNEP) shall be credited to the accounts of UNEP, or to the appropriate trust fund or counterpart fund.

5.3.2 Responsibility for Cost Overruns

FAO is authorized to enter into commitments or incur expenditures up to a maximum of 20 percent over and above the annual amount foreseen in the project budget under any budget sub-line, provided the total cost of the UNEP annual contribution is not exceeded. This may be done without prior authorization, but once the need for these additional funds becomes apparent, a revised budget request should be submitted to UNEP immediately. Cost overruns are the responsibility of FAO unless a revised budget has been agreed with UNEP.

Any cost overrun (expenditure in excess of the budgeted amount) on a specific budget sub-line over and above the 20 per cent flexibility mentioned above should be met by FAO, which originally assumed responsibility for authorizing the expenditure, unless a revision has been agreed to by UNEP prior to the authorization to cover it. Savings in one budget sub-line may not be applied to overruns of 20 percent in other sub-lines, even if the total cost to UNEP remains unchanged, unless this is specifically authorized by UNEP upon presentation of the request. In such a case, a revision to the project document amending the budget will be issued by UNEP.

5.3.3 Claims by Third Parties against UNEP

UNEP does not accept any responsibility for the handling of claims which may be brought by third parties against UNEP and its staff. UNEP and its staff shall not be liable in case of any claims or liabilities resulting from operations carried out by FAO under this project document.

5.3.4 Cash Advance Requirements [9]

An initial cash advance of US$400,000 will be made upon signature of the project document by both parties and will cover expenditures expected to be incurred by FAO during the first three months of the project implementation. Subsequent advances are to be made quarterly, subject to:

(i) Confirmation by FAO at least two weeks before the payment is due, that the expected rate of expenditure and actual cash position necessitate the payment, including a reasonable amount to cover "lead time" for the next remittance; (see format of request in Annex N.) and

(ii) The presentation of:

- **a satisfactory financial report showing expenditures incurred for the past quarter, (see format in** Annex O**.) under each project activity and**
- Timely and satisfactory progress reports on project implementation.

(iii) Disbursements to project countries will take place through FAO country offices and strictly in accordance with FAO financial procedures.

5.3.5 Amendments

The Parties to this project document shall approve any modification or change to this project document in writing.

[9] FAO has requested that UNEP notify FAO in writing of its payments of the advances in favour of FAO, indicating the amount and value date of remittance.