Scientific and Technical Advisory Panel

The Scientific and Technical Advisory Panel, administered by UNEP, advises the Global Environment Facility
(Version 5)

STAP Scientific and Technical screening of the Project Identification Form (PIF)

Date of screening:	@@@@ @@, @@@@
Screener:	Sarah Lebel
Panel member validation by:	Ferenc Toth
Consultant(s):	

I. PIF Information *(Copied from the PIF)*

FULL-SIZED PROJECT	**LEAST DEVELOPED COUNTRIES FUND**
GEF PROJECT ID:	9166
PROJECT DURATION:	4
COUNTRIES:	Chad
PROJECT TITLE:	Strengthening agro-ecosystems' adaptive capacity to climate change in the Lake Chad Basin (Lac, Kanem, Bahr El Ghazal, and part of the Hadjer-Lamis region)
GEF AGENCIES:	FAO
OTHER EXECUTING PARTNERS:	MinistÃ¨re de l'Agriculture et de l'Irrigation (MINAGRI)
GEF FOCAL AREA:	Climate Change

II. STAP Advisory Response *(see table below for explanation)*

Based on this PIF screening, STAP's advisory response to the GEF Secretariat and GEF Agency(ies):
Major issues to be considered during project design

III. Further guidance from STAP

STAP welcomes the FAO proposal "Strengthening agro-ecosystems' adaptive capacity to climate change in the Lake Chad Basin (Lac, Kanem, Bahr El Ghazal, and part of the Hadjer-Lamis region)". The project aims to expand the scope of ongoing adaptation activities in Chad to agricultural and grassland areas by using a Farmer Field School approach. However, STAP believes there are some major scientific and technical gaps in the current document, which will need to be addressed before the project can go forward.

1. STAP's main concern lies in the multiple components of the project relying on natural spirulina production to increase the resilience to climate change impacts of vulnerable populations, particularly women. In light of FAO website statement on Spirulina production that: "In order to reproduce naturally in the open, [spirulina] needs a very specific environment - such as that of the brackish water pools that form on the northeastern shore of Lake Chad at the end of the rainy season. It also needs daytime temperatures of 35-37Â°C dropping to 15-20Â°C at night" (FAO 2010, http://www.fao.org/news/story/en/item/44388/icode/), it is surprising to find no mention of the potential impacts of climate change on the ability to naturally produce spirulina. While literature is sparse in terms of climatic requirements for natural spirulina production, this statement is supported by a number of studies such as Li and Qi 1997, Belay 1997, Wu et al. 1998, which mention optimal growth temperatures of 35-38Â°C for spirulina. The FAO 2008 document entitled "A REVIEW ON CULTURE, PRODUCTION AND USE OF SPIRULINA AS FOOD FOR HUMANS AND FEEDS FOR DOMESTIC ANIMALS AND FISH" also states that "Spirulina shows an optimum growth between 35 and 37 Â°C under laboratory conditions. Outdoors, it seems that an increase in temperature up to 39 Â°C for a few hours does not harm the blue-green alga, or its photosynthetic ability. Thermophilic or thermotolerant strains of spirulina can be cultivated at temperatures between 35 and 40 Â°C. Such a property has the advantage of eliminating microbial mesophilic contaminants. The minimum temperature at which growth of spirulina takes place is around 15 Â°C during the day. At night, spirulina can tolerate relatively low temperatures. The resistance of spirulina to ultraviolet rays seems to be rather high (Richmond, 1986)."

Moreover, Wagener et al (1987) identify the following climatic/natural limitations to Spirulina platensis production (originally from the Lake Chad region):
A. High solar irradiance around noon, especially during the summer, requiring partial shadowing to avoid the risk of bleaching;
B. Occasionally very heavy rainfalls which can bring as much as 10cm of water within a few hours;
C. The occasional sudden invasion of amoebas which, as far as we know, has never been observed elsewhere. If the invasion is not identified early enough, the amoebas can kill the culture within three days.
With average summer temperatures projected to rise by 0.5-5Â°C in Chad by the end of the 21st century depending on the model and scenario (IPCC AR5), it seems that daytime temperatures could frequently exceed the heat tolerance of Spirulina platensis and hinder its production under a changing climate. STAP would therefore recommend looking into projections of temperature extremes and rainfall patterns, including the projected incidence of days with temperatures exceeding 40Â°C in the proposed region of intervention.
As spirulina production is an activity predominantly carried out by women, introducing this as a primary measure of climate change adaptation is likely to make them even more vulnerable to climate change impacts.
If the project intends to keep spirulina production as a key intervention, it may have to consider shifting away from its natural production to the use of bioreactors.
Finally, the first and most important risk to the project which has been identified is climate change. Yet, no mention of the impacts on spirulina production are mentioned.

2. On p.17, it is mentioned that the project will address 6 NAPA priorities. However, this ambitious goal is not well supported by the interventions currently proposed in the document.

References:
Li DM, Qi YZ (1997) Spirulina industry in China: present status and future prospects. J Appl Phycol 9:25â€“28
Belay A (1997) Mass culture of Spirulina outdoorsâ€”the Earthrise Farms experience. In: Vonhask A (ed) Spirulina platensis (Arthrospira): Physiology, Cell-Biology and Biotechnology. Taylor & Francis, London, UK, pp 131â€“158
Wu BT, Xiang WZ, Tseng CK (1998) Spirulina cultivation in China. Chin J Oceanol Limnol 16 (Supplement 1):152â€“157
Wagener, Klaus, and Angela de Luca Rebello. "The mass cultivation of Spirulina platensis in Brazil." In Twelfth International Seaweed Symposium, pp. 69-70. Springer Netherlands, 1987.

STAP advisory response	*Brief explanation of advisory response and action proposed*
1. Concur	In cases where STAP is satisfied with the scientific and technical quality of the proposal, a simple "Concur" response will be provided; the STAP may flag specific issues that should be pursued rigorously as the proposal is developed into a full project document. At any time during the development of the project, the proponent is invited to approach STAP to consult on the design prior to submission for CEO endorsement.
2. Minor issues to be considered during project design	STAP has identified specific scientific /technical suggestions or opportunities that should be discussed with the project proponent as early as possible during development of the project brief. The proponent may wish to: (i) Open a dialogue with STAP regarding the technical and/or scientific issues raised. (ii) Set a review point at an early stage during project development, and possibly agreeing to terms of reference for an independent expert to be appointed to conduct this review. The proponent should provide a report of the action agreed and taken, at the time of submission of the full project brief for CEO endorsement.
3. Major issues to be considered during	STAP proposes significant improvements or has concerns on the grounds of specified major scientific/technical methodological issues, barriers, or omissions in the project concept. If STAP provides this advisory response, a full explanation would also be provided. The proponent is strongly encouraged to:

project design	(i) Open a dialogue with STAP regarding the technical and/or scientific issues raised; (ii) Set a review point at an early stage during project development including an independent expert as required. The GEF Secretariat may, based on this screening outcome, delay the proposal and refer the proposal back to the proponents with STAP's concerns. The proponent should provide a report of the action agreed and taken, at the time of submission of the full project brief for CEO endorsement.