

PROJECT BRIEF

PROJECT NUMBER:	<i>[Implementing Agency Project No not yet assigned]</i>
PROJECT NAME:	Regional (Benin, Guinea, Mali, Mauritania, Niger, Senegal): Reducing Dependence on POPs and other Agro-Chemicals in the Senegal and Niger River Basins through Integrated Production, Pest and Pollution Management
DURATION:	4 years
IMPLEMENTING AGENCY:	UNEP
EXECUTING AGENCIES:	FAO
ELIGIBILITY:	All the participating countries are eligible pursuant to paragraph 9 (b) of the GEF Instrument. Five of the participating countries (Benin, Mali, Niger, Mauritania and Senegal) are Contracting Parties to the Stockholm Convention on Persistent Organic Pollutants (POPs). Guinea is scheduled to ratify in April 2005.
GEF FOCAL AREA:	Joint International Waters-Global Contaminants / POPs Reduction with relevance to Biodiversity
GEF PROGRAMMING FRAMEWORK:	Operational Programs 10 and 14
GEF STRATEGIC PRIORITIES:	IW-3 and POP-3

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 the 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 sub-regional pesticide legislative bodies. It will set up water-quality assessment studies and run simulations on likely impacts on aquatic biota and human health, and help communities adopt improved and alternative production methods and community-based pesticide-monitoring systems and, finally, promote development of local, national and sub-regional networks of stakeholders interested in improving the current situation. The outcomes will provide national-level decision-makers with solid examples for both 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 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.

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:	\$ 1,838,426
	FAO/USAID:	\$ 450,000
	Governments (in cash and kind):	\$ 999,734
	Farmer Participation (in kind):	\$ 750,000
	Other sources by Agency: UNEP	\$ 50,000
	FAO (in-kind):	\$ 370,000
	PDF B Co-Financing:	\$ 369,350
	Sub-Total Co-Financing:	\$ 4,827,510
Total Project Cost:		\$ 9,305,340

OPERATIONAL FOCAL POINT ENDORSEMENTS:

Country	Operational Focal Point Name	Position	Date of Endorsement
Benin	Pascal Z. YAHA	Point Focal Operationnel du FEM Ministere De l'Environnement et de l'Habitat et de l'Urbanisme	17 March 2005
Guinea	Sekou Mohamed CAMARA	Directeur du Fond de Sauvegarde de l'Environnement. Point Focal Operationnel National	14 Mars, 2005
Mali	Ibrahima DOUMBIA	Directeur National Ministere De l'Environnement et de l'Assainissement, Direction Nationale de L'Assainissement et du Controle des Pollutions et des Nuisances	09 March, 2005
Mauritania	El Hadrami Ould BAHNEINE	Directeur de l'Environnement Ministère du Développement Rural et du l'Environement,	03 March 2005
Niger	Seydou YAYE	Commissariat Charge du Developpement Direction Generale des Programmes Sectoriels, Ministere de l'Economie et Des Finances	03 March 2005
Senegal	Fatima Dia TOURE	Directeur de l'Environnement et de la Protection de la Nature, Ministere de l'Environnement et de la Protection de la Nature	04 March 2005

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LIST OF ACRONYMS

ANCAR	<i>Agence Nationale de Conseil Agricole et Rural</i>
ASPRODEB	<i>L'Association Sénégalaise pour la Promotion du Développement à la Base.</i>
CBD	Convention on Biological Diversity
CILSS	<i>Comité Permanent Inter Etats de Lutte contre la Sécheresse au Sahel</i>
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, D.C., 1973.
CMDT	<i>Compagnie Malienne de Textiles</i>
COP	Conference of Parties (<i>e.g.</i> , to a specific Convention)
CPH/AOC	<i>Comité Phytosanitaire des Pays de la zone Humide de l'Afrique de l'Ouest et du Centre</i>
CSP	<i>Comité Sahélien des Pesticides</i>
EC	Emulsifiable Concentrate: a water-soluble formulation for pesticides, commonly used by farmers
ENDA	Environment and Development Action in the Third World
FAO	Food and Agriculture Organization of the United Nations
F CFA	<i>Francs Communauté Financière Africaine</i>
FFS	Farmer Field Schools
GCP/RAF/378/NET	Reference to Dutch-funded programme: Integrated Production and Protection Management programme (IPPM) in West Africa (Mali, Senegal, Burkina Faso)
GEF	Global Environment Facility
IA	Implementing Agency
IFCS	Inter-Governmental Forum on Chemical Safety
IOMC	Inter-Organisational Programme for the Sound Management of Chemicals
IPCS	International Programme on Chemical Safety
IPPM	Integrated Production and Pest Management
ISRA	<i>Institute Sénégalaise pour la Recherche Agricole</i>
ITA	<i>Institute Technologique Agricole</i>
NBA	Niger River Basin Authority
NGOs	Non-Governmental Organizations

NIP	National Implementation Plan (for POPs under the Stockholm Convention)
OAU	Organization for African Unity (Currently, African Union)
ONAHA	Office Nationale des Amenagements Hydro-Agricoles
OP	(GEF) Operational Programme
PASAOP	<i>Programme dAppui aux Services Agricoles et aux Organisations Paysannes</i>
PASP/ASP	<i>Le Programme africain relative aux stocks de pesticides (African Stockpiles Programme)</i>
PDF	Project Preparation and Development Facility (GEF)
POPs	Persistent Organic Pollutants
PNIR	<i>Programme National d'Infrastructures Rurales</i>
PRONAT	<i>Protection Naturelle des Cultures</i>
PTS	Persistent Toxic Substances
Ramsar Convention	Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar, Iran, 1971.
RBA	Regionally Based Assessment of Persistent Toxic Chemicals (GEF Project)
SAED	<i>Société d'Amenagement et d'Exploitation des Terres du Delta</i>
SC	Stockholm Convention on Persistent Organic Pollutants
SRI	System of Rice Intensification
TOT	Training of Trainers
ULV	Ultra-Low Volume: a pesticide formulation for use in aircraft and special ground equipment that results in very low dosages being applied
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNITAR	United Nations Institute for Training and Research
WB	World Bank
WHO	World Health Organization
WWF	World Wildlife Fund

PROJECT DESCRIPTION

BACKGROUND AND CONTEXT

Background

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 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 effective for preserving or increasing production. A slightly stronger argument can be made for appropriate pesticide use in vegetable production, but here non-toxic alternatives exist. 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 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*¹. 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 Mali² 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,

¹ 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.

² 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.

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.*
- *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/LOCUSTOX³.

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 poisoning⁴. 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 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

³ FAO, LOCUSTOX Project, Volumes I, II, III

⁴ ENDA-Pronat. 2003. Analyse des donnees d'enquete sur la sante et les pratiques agricoles, pp. 16. ENDA Tiers Monde, Dakar.

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 significant⁵. 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.

⁵ 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 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 Steering Committees (NSCs) 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 NSC; 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 Sahélien 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 2004), some 15,000 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 agreed on in principle by the Netherlands and FAO and is currently being designed, with expanded scope to include Benin and Cape Verde, and a greater emphasis on national institutionalization of the IPPM/FFS extension approach. This Phase II programme, estimated at around USD \$8 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. An estimated redirected baseline co-financing of \$1,856,763 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 them to better understand and assess the risks posed by agrochemical use mediated by direct exposures to pesticides and environmental contamination. It will also promote an understanding of the environmental consequences of the use and misuse of pesticides. The project, as in the case of the PDF-B phase, will be predominantly based on participatory and community approaches.

25. Five of the participating countries have already signed and ratified the Stockholm Convention (Senegal, Benin, Mali, Mauritania, Niger and Senegal). The other participating country (Guinea) is a convention signatory and is in the process of ratification, scheduled for April 2005. 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.

INSTITUTIONAL COORDINATION AND SUPPORT

Core commitments and linkages

26. 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.”
27. 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.
28. 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”.

29. 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 Steering Committee level, but perhaps for more technical staff, in workshops and meetings.
30. 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.
31. 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 project 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.
32. The other POPs project is a regional project entitled “*African Stockpiles Program, Strategic Partnership I*”. Both Niger and Mali are participants in this project that is planned to enter its full project phase in the near future. The project is currently in its appraisal phase. 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.

Implementing Agency (UNEP) Programming Context

33. 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 of 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.

34. 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

35. 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.
36. 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/378/NET). This program will start its second phase in mid-2005 with a four-year programme and provide assistance in terms of redirected co-financing, trained personnel and the collective experience of sub-regional and headquarters management teams.
37. A Netherlands'-funded partnership programme with FAO (FNPP) is currently starting a second phase to last to the end of 2007. 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. It is anticipated that the GEF project, during the PDF-B phase, has already made contact with and plans for collaborative efforts on this topic. 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.

38. FAO has operated a programme for the prevention and elimination of obsolete pesticides since 1994. This programme has been funded by the Government of the Netherlands consistently for ten years. The initial focus of the programme was Africa and the Near East.

Consultation Coordination and Collaboration with ongoing and planned activities

39. 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/378/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\$ 2.6 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 millions 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

40. 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.

41. Since 1982, the NGO ENDA Third World, 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

42. 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.
43. Building knowledge and technical capacity will be based on a modification 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 optimise decision-making regarding the appropriate use of land and water resources and the selection of appropriate agricultural practices.*
44. 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* 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 sediment and water-quality samples will be put into a “hands-on” adult-learning format for use in

an FFS context to support this objective. Data from cholinesterase samples will further support the 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 environment⁶ 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.

45. 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.

46. 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 psychological dependence on agrochemicals, particularly on POPs, PTS and other highly toxic substances in the sub-

⁶ Especially for market gardening and cotton that generally exhibit substantially higher pesticide loads.

region. It will also improve farmer yields and incomes while avoiding environmental contamination.

47. 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

48. 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

49. *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 2009;
- 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 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 2008 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 Project Steering Committee (RPSC) to finalize site selections, choice of National Coordinators (NC), and review details of project start-up plan;
 - ii. Conduct 6 National PSC 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 cholinesterase tests in collaboration with local health services;
 - 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 Project Steering Committee (NPSC);
 - iv. Consultants to carry out policy study;
 - v. Study finalized and presented to NPSC and pesticide policy working group (PPWG);

- vi. PPWG formulates and presents brief set of policy recommendations to the governments, using study as supporting document

Component 2: Assessments of Freshwater Contaminants

50. *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 and sediment samples from target sites.

Expected outcomes include:

- A clear picture of contaminant levels along the Senegal and Niger rivers provided by water and sediment 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 NPSCs 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 NPSC for approval;
- b) National teams will be trained on sampling methods by CERES/Locustox staff members in country-level workshops;
- c) Water and sediment 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

51. *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 2009;
- Regional capacity for participatory training augmented by total of 150 “technician” trainers and 300 farmer trainers by 2009;
- Lessons learned and curriculum developed during the course of the project shared across all six countries by 2009;
- Substantial participation by women in FFS assured: at least 50% in market gardening, 30% in rice and 20% in cotton by 2009;
- Community-based monitoring systems for pesticide use developed and used by all 30 target communities by 2009.
- Successful examples of self-financed FFS (3 per country) established in each country by 2009 and at least two new FFS conducted by local farmer-facilitators in neighbouring communities by 2009.

To this end activities will be organized as follows:

- a) Hold first sub-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

52. *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 sub-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

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

Activities will be organized as follows:

- a) A Regional Project Steering Committee (RPSC) will be set up comprising a representative each from UNEP, FAO, the participating countries, other Implementing Agencies. The RPSC 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 or overall and national coordinating structures);
- b) Six National Project Steering Committee (NPSC) will be set up comprising a membership to be decided by each country's lead ministry (which may vary among countries);
- c) A Regional Coordination Unit (RPCU) will be set up in the sub-region. The RPCU will comprise at least a Regional Project Coordinator 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 will be nominated by the countries and chosen by FAO and UNEP in collaboration with the RPSC who will supervise and organize all planned activities at the national level during the implementation phase in consultation with the RPCU. Semi-annual meetings among the NPCs and the RPC will be held. One of these meetings, each year, will take place immediately prior to the meetings of the RPSC as a means of preparing up-to-date synopses of information for presentation to the RPSC. Annual sub-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 sub-regional consultation meetings among the national and sub-regional project coordinators;
- d) The Project Coordination Unit will maintain records of project activities and project expenditures at the national and sub-regional 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;
- e) The RPSC will first meet immediately following completion of the appraisal phase and signatures of the GEF CEO, to approve planned project activities and to conclude any required agreements and arrangements for project execution. The RPSC will subsequently meet one time per year including what will be termed 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 RPSC meeting will ensure that all deliverables are completed and that arrangements have been made for sustaining of major consultative and informational components created by the project;

- f) For the purposes of project execution, a Regional Project Coordination Unit (RPCU) will be established in the sub-region. The RPCU will comprise at least a Regional Project Coordinator 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 will be nominated by the countries and chosen by the RPSC who will supervise and organize all planned activities at the national level during the implementation phase in consultation with the RPCU. Semi-annual meetings among the NPCs and the RPC will be held. One of these meetings, each year, will take place immediately prior to the meetings of the RPSC as a means of preparing up-to-date synopses of information for presentation to the RPSC. Annual sub-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 sub-regional consultation meetings among the national and sub-regional project coordinators.

Risks and Sustainability

Risks

54. 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.

55. 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

56. The project aims to actively involve a range of stakeholders, including sub-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.

57. *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.

58. *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.

59. *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. 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.

60. *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.
61. *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

62. *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.
63. *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.
64. *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

65. 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 sub-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 sub-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).
66. 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 sub-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 sub-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.
67. 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.

68. This sub-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, AGRHYMET⁷, various NGOs (e.g., PAN Africa, ENDA-Pronat) and the sub-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.*
69. 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.
70. ENDA Third World 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 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

71. 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

⁷ 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, Mauritania, 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.

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.

72. 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.
73. 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 \$1,061,234 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 \$1,936,763, of which \$1,856,763 is redirected baseline from the Netherlands-funded FAO IPPM project. Additional co-financing will be sought from bilateral sources in the amount of \$1,471,663. 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 US \$	Alternate US \$	Increment US \$
GLOBAL ENVIRONMENTAL BENEFITS	98,992,000	108,227,340	9,305,340
PDF-B Phase		741,850	741,850
Component 1 - Awareness Raising and Establishing Baselines	16,126,000	17,450,087	1,324,087
Component 2 - Assessments of Freshwater Contaminants	1,096,000	2,565,087	1,469,087
Component 3 - Developing Best Practices	79,200,000	82,466,087	3,266,087
Component 4 - Developing Community Networks	2,400,000	3,469,087	1,069,087
Component 5 - Project Coordination and Management	100,000	1,302,765	1,202,765
Executing Agency Overheads	0	232,377	232,377

Table 3
Project Budget Summary and Component Financing in US \$

Project Activities	GEF	Co-financing		Grand Total
		Governments	Other	

			Sources	
Component 1 - Awareness Raising and Establishing Baselines	857,762	166,325	300,000	1,324,087
Component 2 - Assessments of Freshwater Contaminants	819,087	150,000	500,000	1,469,087
Component 3 - Developing Best Practices	1,082,678	183,409	2,000,000	3,266,087
Component 4 - Developing Community Networks	569,087	200,000	300,000	1,069,087
Component 5 - Project Coordination and Management	544,339	300,000	358,462	1,202,765
EA Overheads	232,377	0	0	232,377
PROJECT TOTAL	4,105,330	999,734	3,458,426	8,563,490
PDF-B	372,500	61,500	307,850	741,850
GRAND TOTAL	4,477,830	1,061,234	3,766,276	9,305,340

MONITORING, EVALUATION AND DISSEMINATION

74. 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.

75. There are four entities with roles to play in the Monitoring and Evaluation process:

- UNEP will receive from the RPCU quarterly progress and financial reports. UNEP will also serve as a member of the Regional Project Steering Committee (RPSC). FAO, as the Executing Agency, will also be represented on the Project Steering Committee and FAO officers will make field visits to assess progress and problems (as needed and agreed with the RPCU and RPSC). UNEP and FAO will jointly appoint independent evaluators for the conduct of mid-term and final project evaluations.
- The RPCU 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 with particular attention to project sites or activities experiencing difficulties or suffering delays.
- The RPSC 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 national coordinators will review all national reports and offer policy guidance as needed. They will play a key role in facilitating linkages, both in their respective countries and between countries, and will maintain reporting of progress and any difficulties.

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

77. 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 Project Steering Committee for review.
78. 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.
79. 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.
80. 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.
81. 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.
82. 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.
83. 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 sub-regional level by the project coordinator who will submit biannual activity reports that will be transmitted to FAO and UNEP.

ANNEXES

- Annex A: Incremental Cost Analysis
- Annex B: Logframe matrix
- Annex C: STAP Review and Response from FAO/UNEP.
- Annex C-1: STAP Response from FAO/UNEP.
- Annex D: Summary of PDF-B Community Survey Results.
- Annex E: Summary of PDF-B Water Contaminant Survey Results.
- Annex F: Summary of FAO Sub-Regional Integrated Production and Pest Management Programme
- Annex G: Site Identifications.
- Annex H: Workplan and Timetable
- Annex I: Monitoring and Evaluation Plan
- Annex J: Root Cause Analysis
- Annex K: Project Coordination Structure
- Annex L: Self-financed Farmer Field Schools