

PROJECT BRIEF

IDENTIFIERS

Project Number: *[Implementing Agency Project N. not yet assigned]*

Project Name: **Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama: Regional Program of Action and Demonstration of Sustainable Alternatives to DDT for Malaria Vector Control in Mexico and Central America**

Duration: 3 years

Implementing Agency: United Nations Environment Program

Executing Agencies: Regional: Pan American Health Organization (PAHO)
National: Ministries of Health of Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Panama

Eligibility: The participating countries are eligible under paragraph 9 (b) of the Instrument for the Restructured GEF. The proposed intervention is consistent with the provisions of the POPs Convention.

GEF Focal Area: International Waters

GEF Programming Framework: Global Contaminants, Operational Program Number 10
Draft Operational Programme 14 on POPs

SUMMARY:

During the last decade Mexico and Central American countries have gradually discontinued DDT sprayings for vector control. Malaria, however, still poses a serious risk for the population of these countries. This proposal aims to prevent reintroduction of DDT for malaria control by promoting new integrated vector control techniques and implementing a coordinated regional program to improve national capacities. Major project components will be: the implementation of demonstration projects of vector control without DDT or other persistent pesticides that can be replicable in other parts of the world and which are cost-effective, environmentally sound, and sustainable; the strengthening of national and local institutional capacity to control malaria without the use of DDT; and the elimination of DDT stockpiles in the eight participating countries.

COSTS AND FINANCING (THOUSAND US \$):

GEF

Project	:	US\$ 6,341
Project Support Costs	:	US\$ 824
PDF B	:	US\$ 330
Sub-Total GEF	:	US\$ 7,495

Co-financing

PDF-B (all sources)	:	US\$ 440
CEC	:	US\$ 200
PAHO	:	US\$ 654 (in kind)
Governments		US\$ 2,814 (in cash & kind)*
Sub-Total Co-Financing	:	US\$ 4,108

Total Project Cost : **US\$ 11,603**

* This figure represents an in principle commitment from the participating countries to redirect their malaria program budgets in the demonstration areas to project activities.

OPERATIONAL FOCAL POINT ENDORSEMENTS:

COUNTRY	OPERATIONAL FOCAL POINT NAME	POSITION	DATE OF ENDORSEMENT
Belize	Elvis Requena	Ministry of Economic Development	
Costa Rica	Guaria Vargas	Executive Director , FUNDECOOPERACION	1/10/01
El Salvador	Ana Maria Majano	Minister of Environment and Natural Resources	
Guatemala	Sergio Augusto Lavarreda Anleu	Minister of the Environment	
Honduras	Xiomara Gomes	Minister of Environment and Natural Resources	
Mexico	Ricardo Ochoa	Ministry of Finance of Mexico, Director, International Financial Institutions (SHCP)	
Nicaragua	Garcia A. Cantero	Advisor to the Minister Coordinator for PROTIERRA	24/9/01
Panama	Ricardo Anguizola	Administrador General, Autoridad Nacional del Ambiente (ANAM)	

IA CONTACT:

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LIST OF ACRONYMS/ABBREVIATIONS

CEC	Commission for Environmental Cooperation (NAFTA)
CDC	Center for Disease Control and Prevention (USA)
CINVESTAV	Centro de Investigación y Estudios Avanzados del Instituto Politécnico Nacional. Unidad Mérida, Mexico
CIRA-UNAN	Centro para la Investigación en Recursos Acuáticos de Nicaragua, Universidad Autónoma de Nicaragua
DANIDA	Danish International Development Agency
DDT	dichloromethyltrichloroethane [1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane]
GEF	Global Environment Facility
GIS	Geographic Information System
GTZ	German Agency for Technical Cooperation
HCP	Division of Disease Prevention and Control (PAHO)
HEP	Division of Health and Environment (PAHO)
IDA	International Development Association (World Bank Group)
IDB	Inter-American Development Bank
IDRC	International Development Research Center (Canada)
LUCAM	Laboratorio Unificado de Control de Alimentos y Medicamentos – Guatemala
MAG	Ministerio de Agricultura y Ganadería – Costa Rica
MASICA	Program on Health and Environment in Central American Isthmus
NAFTA	North American Free Trade Agreement
NARAP	North American Regional Action Plan
NGO	Non Governmental Organizations
PAHO	Pan American Health Organization
PDF	Project Preparation and Development Facility
PLAGSALUD	Occupational and Environmental Aspects of Pesticides in the Central American Isthmus (DANIDA/PAHO)
SHA	Special Program for Health Analysis (PAHO)
SICA	Sistema de la Integración Centroamericana (Central American Integration System)
RBM	Roll Back Malaria Program (WHO)
UN	United Nations
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WB	World Bank
WHO	World Health Organization

PROJECT DESCRIPTION

BACKGROUND – BASELINE COURSE OF ACTION

1. Malaria is a transboundary problem affecting most tropical countries. It is a protozoal infection transmitted to human beings by an infected anopheline mosquito bite mainly between sunset and sunrise. Human malaria is caused by four species of plasmodium protozoa: *Plasmodium falciparum*, *P. vivax*, *P. ovale* and *P. malariae*. In Central America and Mexico the main malaria vectors are *Anopheles pseudopunctipennis*, *A. albimanus*, and *A. vestitipennis*. It is estimated that 89,128,000 people in Mesoamerica live in areas environmentally suitable (high temperatures and humidity) for the transmission of malaria, of which 23,445,000 (35%) live in highly endemic areas. Migration of infected people and environmental conditions such as rainfall patterns, altitude and temperature all facilitate the movement of the disease across national borders. Only an integrated regional approach can address the human and environmental challenges in malaria prone areas.

2. DDT has been extensively used as an insecticide for malaria vector control and in agriculture in Mexico and Central America since the 1950's; sprayed not only in households but also on water surfaces in an attempt to control mosquito breeding. Concerns regarding environmental contamination by DDT compounds as well as the development of vector resistance to the organochlorine insecticides, motivated the countries to initiate policies to gradually discontinue DDT sprayings during the 1980's and the 90's. Belize, for example, had been using DDT up to the year 1999 and Mexico, up to the year 2000. The assessment made during the PDF-B phase revealed that at least 85,000 tons of DDT was sprayed in households and its surroundings in malaria endemic areas in the last 40 years. Malaria endemic areas in Guatemala received an of 204 tons of DDT per year between 1958 and 1979. Nicaragua sprayed 268 tons/year between 1959 and 1962. Mexico sprayed 5,110 tons/year of DDT between 1957 and 1960, going down to 290 tons/year between 1992 and 1999. El Salvador sprayed 198 tons/year from 1960 to 1973.

3. DDT and its metabolites, especially *p,p'*-DDE, are highly stable toxic compounds that persist in the environment for many years and can accumulate in living organisms. They can persist decades in soils in association with organic matter and clay particles. DDT is transported though the water cycle by rainfall and surface water runoff, and can be carried to remote areas by the atmosphere as well, thus contributing to environmental contamination at global level. Concerns about DDT residues in water, sediment and soil, as well as in the food chain in Mexico and Central America were reinforced by data brought forth sub-regional and national reports developed during the PDF-B phase. An assessment of DDT and deltamethrin exposure was carried out in Mexico in the two states with the highest prevalence of malaria and a history of pesticide application. In Chiapas, samples were obtained at the time when DDT was being used in the malaria control program. In Oaxaca, samples were collected two years after the final spraying of DDT and two days after deltamethrin (a pyrethroid used as a substitute for DDT) application. Soils samples collected from the bare dirt floor inside a house that had been sprayed

with DDT and analyzed during the PDF-B phase showed 83 mg/kg of DDT, 41 mg/kg of DDD and 14 mg/kg of DDE, compared to 0.37 mg/kg of DDT, 0.02 mg/kg of DDD and 0.2 mg/kg of DDE found in a house that had not been sprayed. Outside the same house, the soil samples had 49 mg/kg of DDT, 13 mg/kg of DDD and 5.7 mg/kg of DDE, compared to 0.6 mg/kg of DDT, 0.6 mg/kg of DDD and 0.2 mg/kg of DDE in the control area. In Nicaragua, samples of sediments taken from coastal lagoons in malaria endemic area had 50 µg/kg of DDT, 46 µg/kg of DDD and 94 µg/kg of DDE.

4. Long-term health effects of these compounds on the malaria campaign personnel that were exposed by spraying DDT, or populations residing in villages where these pesticides were applied are also of concern, although the specific effects are not well understood. Mean concentration of DDT and DDE, as measured in whole blood, were 68 and 87 µg/l for children living in Chiapas and 27 and 61 µg/l for adults respectively. Sprayers in Chiapas had the highest levels of exposure with 170 and 190 µg/l of DDT and DDE. As expected, DDT levels were lower two years after the final application in Oaxaca (20 and 13 µg/l for children and adults respectively). 60 newborn had their umbilical chord blood tested in Oaxaca coastal zone and DDE was found in a mean level of 13 µg/g. Deltamethrin exposure was assessed only in children in Oaxaca: 50% of the exposed group had urinary levels above the limit of detection and 6% had levels above 25 µg/l (five times the limit of detection), with a negative trend with age. Information related to Central America is reported in the regional report, however, most of these countries do not have data or documentation on the level of DDT residues.

5. These environmental and health effects are compounded by the fact that Central American countries are particularly vulnerable to natural hazards such as hurricanes and earthquakes. After Hurricane Mitch in 1998, approximately one ton of DDT that were poorly stored was washed into the Caribbean sea in Nicaragua. Preliminary studies conducted in Honduras after the hurricane indicated the presence of DDT in the environment and human population, probably originating from an industrial plant that had been flooded. The existing DDT stockpiles in these countries, which generally are stored in improper conditions, therefore pose a great risk of contamination of national and international waters as well as the possibility of harm to human health and environment under disaster situations.

6. In the absence of GEF intervention, given the low national budgets for malaria control, weak national health systems, and lack of institutional and community level awareness about the effects of DDT exposure on environment and human health, the reintroduction of DDT for malaria control is likely. Particularly considering its low cost and relative effectiveness as an insecticide. Countries such as Guatemala, Honduras and Belize, where national malaria campaigns have been weak, might contribute to increase the regional problem because of transboundary spread of the malaria disease. The benefits of the isolated initiatives to develop new techniques of malaria vector control, that have flourished in Mexico, Costa Rica, Nicaragua and Panama during the last few years, could be lost in the long run due to lack of coordination and exchange of experience. The recent experience of South Africa that has had recently to resolve itself using DDT to fight a malaria outbreak exemplifies the difficulty of phasing-out

DDT in a sustainable manner, and the need to demonstrate conclusively the efficiency of an array of alternative methods.

GEF Programming Context

7. This project conforms with the “Contaminant-based” Operational Programme No 10 and will “*help demonstrate ways of overcoming barriers to the adoption of best practices that limit contamination of the International Waters environment*”. The proposed activities are also consistent with several provisions of the recently adopted Stockholm Convention on POPs, and with the draft Operational Programme on POPs under development. Five of the participating countries have already signed the POPs convention: El Salvador, Honduras, Mexico, Nicaragua and Panama. The other three countries have expressed their intention to sign it.

Implementing Agency Programming Context

8. UNEP is the task manager for chapter 19 of agenda 21 on toxic substances and the Secretariat for the Stockholm Convention on Persistent Organic Pollutants which was adopted in May 2001. UNEP will facilitate the coordination between this project and the other POPs projects developed under its aegis. In particular links with the UNEP/GEF project under development "Reducing Pesticide Runoff to the Caribbean Sea" which is focused on Colombia, Costa Rica and Nicaragua will be consolidated through participation of the national coordinators to the respective national committees and participation of the regional project manager to the respective steering committees. Contacts have been established with the regional coordinator of the GEF/UNDP/UNEP project “*El Corredor Biologico Mesoamericano: una iniciativa regional de Desarrollo Sostenible*” for future coordination of environmental activities, particularly related to community participation and awareness in the areas of demonstration projects in Costa Rica and Panama.

Executing Agency Context

9. PAHO has an office in each country in the region and has a central role in providing technical cooperation for both the establishment of malaria control programs and prevention of adverse effects related to the use of pesticides. PAHO has been called upon by UNEP to play a strategic role in Latin America and the Caribbean in the implementation of Governing Council Decision 19/13C (1997) which mandates a series of immediate actions on POPs, including exchange of information. As part of the initiative for the Sustainable Development of the Central American Region, PAHO, with strong support of the Nordic Countries, has launched the "Program on Health and Environment in the Central American Isthmus", known by its Spanish acronym MASICA (1990). This program has focused on obtaining political commitments to integrate environment, health and development actions. One of its main components is the Project PLAGSALUD (Occupational and Environmental Aspects of Pesticides in the Central American Isthmus), established in 1994 with funding from DANIDA. Using a bottom-up approach, this project has been active in all seven Central American countries for the last six years. Enjoying government and civil society support, it has already achieved important results such as the improvement of the surveillance and control of acute intoxication from pesticides, the revision of pesticide legislation, the establishment of local pesticide committees, and more specifically the improvement of the protection of malaria and other vector control personnel from

exposure to pesticides. This proposal will build on and complement the groundwork already accomplished by PLAGSALUD.

National and Regional Context

10. In 1996 the Parties to the North American Free Trade Agreement (NAFTA), working with the Secretariat for the North American Commission for Environmental Cooperation (CEC), approved a North American Regional Action Plan (NARAP) to reduce the exposure of humans and the environment to DDT compounds through phasing out the use of DDT for malaria control in Mexico, transferring this experience to other countries, and eliminating illegal uses of DDT. The CEC continued its holistic approach to malaria control in Mexico during the PDF-B phase by executing demonstration projects which brought together an integrated vector control management strategy with the full spectrum of related public health activities and services. This program maintains a regional perspective that encourages sharing of experiences with other Latin American and Caribbean countries to ensure that malaria is controlled throughout the Region by environmentally sound methodologies, with participation of local communities, non-governmental organizations, business and industry sectors, state and municipal government institutions, academia, and technical and policy experts.

11. In 1991, 1260 tons of DDT were sprayed in Mexico, in 1997 477 tons, and in the year 2000 no DDT was sprayed. Belize discontinued the use of DDT during the PDF-B phase. Three different pilot projects were undertaken in the State of Oaxaca in Mexico to assess the effectiveness of alternative malaria control measures including field assessment of bed nets as a complementing measure to control malaria and field evaluation of deltamethrin as a substitute to DDT as well as environmental actions to prevent the proliferation of malaria vector. The successful methodologies tested in these pilot projects will be replicated in the demonstration projects. Guatemala, Nicaragua and Honduras have had positive experience in using *Bacillus thuringiensis* and *Bacillus sphaericus* as a biological tool for malaria vector control. Honduras and Guatemala have also experimented controlling mosquito breeding by using larvae eating fishes. Guatemala has been experimenting with Neem tree, an African specie of plant with repellent properties. Costa Rica, El Salvador and Panama reported positive malaria vector control by improving the sanitary conditions in malaria endemic areas. Physical barriers such as mosquito nets have also been adopted as complementary strategies in all participating countries.

RATIONALE AND OBJECTIVES

12. There is a need to strengthen institutional technical capacity at a regional scale for assessment and control of malaria disease vectors. Countries with less capacity to address malaria control without DDT need help from their neighbors who have had successful experiences. Only a long-term regional cooperative program can help deter some countries from returning to use DDT or using other persistent pesticides to control endemic malaria vectors. The participating countries are committed to developing and implementing comprehensive management practices that will build and strengthen awareness about the importance of environmental conservation and sound water management in the control and prevention of

endemic diseases with the active participation of local communities, particularly in immigration corridors. The principles which form the basis for the proposed project are: integrated inter-institution and inter-sectoral (environment and health) approaches; broad community participation in all steps of the project; integration of the work to existing national institutions so that no parallel structures are created; technical, financial and organizational sustainability of the new approaches to malaria control; and widespread dissemination of the information generated by the project.

13. The proper storage and eventual disposal of POPs presents a problem throughout the Region. The PDF-B has identified approximately 135 tons of DDT stored throughout the region, some in very bad conditions in leaking containers as the 15 tons in Guatemala. Current methods of storage in old warehouses are insufficient to prevent environmental contamination and human contact. Nicaragua and Honduras have already received international help to dispose of their DDT stockpiles, but assistance is required for the other six countries for this endeavour.

14. In the execution of the PDF B Grant, the following lessons were learned: (i) The experimental projects developed in Mexico showed that integrated vector management with community participation, in addition to new ways of monitoring and treating the disease, can eliminate the use of pesticides after 2 years of continuous actions; (ii) The communication network initiated during the PDF-B facilitates the exchange of technologies in use in different countries as was seen in the 3 regional meetings where the participating countries presented and were questioned about their malaria control strategies; (iii) In order to be replicable in other parts of the world, in different ecosystems and socio-economic conditions, the Mexican and Central American experiences of malaria control without DDT need further detailed documentation and close monitoring of activities and results; (iv) There is a need for standardization and validation of laboratory procedures for monitoring the presence of DDT in the environment and in people, and for malaria detection, in order to have comparable data; (v) there is a need for national and local institutional capacity building in order to achieve sustainability of the new methodologies of malaria control, and (vi) a specially designed Webpage and the application of a GIS are useful tools for malaria risk assessment, epidemiological analysis, monitoring and evaluation of the effectiveness of interventions, decision making in health/environment related issues, and will contribute to the sustainability and replicability of the project activities.

15. The overall objective of the project is to demonstrate that methods for malaria vector control without DDT or other persistent pesticides are replicable, cost-effective and sustainable, thus preventing the reintroduction of DDT in the region. Human health and the environment will be protected in Mexico and Central America by promoting new approaches to malaria control, as part of an integrated and coordinated regional program. The establishment of a regional network will facilitate the exchange of best practices and lessons learned among neighboring countries. A major outcome will be increased government and local community awareness of DDT and other pesticides hazards to the environment and human health, and adjustment of future behavior regarding the use of persistent pesticides.

16. The results of this project will be felt at three levels: **(i)** At the national level, each one of the 8 participating countries will have the documented results of a well monitored demonstration project of malaria vector control without DDT or other persistent pesticides; **(ii.)** At the regional level the lessons learned in each country will be exchanged and a regional consensus will be built; **(iii.)** At the global level the results of this project will define replicable models for malaria control based on cost effective, environmentally sound and sustainable strategies. These models which will be thoroughly tested and documented in a series of interconnected demonstration projects will constitute a set of best practices which may be applied in other regions of the world.

PROJECT ACTIVITIES / COMPONENTS AND EXPECTED RESULTS

17. After a consultation process, led by PAHO and the CEC, consisting of meetings and studies implemented during the PDF B phase, four different groups of actions were identified as necessary to address countries' needs to lower their vulnerability to using DDT for malaria control. The actions, as presented in Annex B (Logical Framework), are organized under the following four components:

18. **Component 1: *Demonstration Projects and Dissemination.*** The objective is to implement, evaluate, and disseminate the alternative strategies of malaria vector control without use of DDT which were developed during the PDF-B phase. The main outcome is to avoid future reintroduction of DDT or other persistent pesticides in national malaria control programs. This component represents a major part of this project and most of the resources will be concentrated on it. A total of nine demonstration projects will be implemented under specific ecological conditions in each of the participating countries, using a set of integrated methods of malaria control according to the RBM/WHO and the Mexican experience of malaria control without DDT. The nine sites for demonstration projects were defined and delimited in each country during the PDF-B according to government suggestions about local needs. The alternatives tested in each demonstration projects will be closely assessed and evaluated in terms of their technical and economic effectiveness.

19. The activities that will be implemented in the demonstration projects are described in Annex F. The settings for demonstration areas include different malaria vectors, endemic levels of the disease, and environmental and social-economical conditions. A technical manual will provide basic information on malaria vector control without use of DDT while confronting different vector species and different ecological conditions in each country. Workshops will be organized locally for health and environment personnel, community leaders, and NGOs involved in each demonstration project. The exchange of information and experiences of all 8 participating countries on malaria vector ecology and entomology, integrated malaria vector control methods, field operations, as well as community participation techniques will be facilitated. Community awareness, community training and public participation are important tools in the implementation of integrated vector control strategies and will be encouraged and supported through workshops, training courses, participation in demonstration projects, preparation of

material for wide diffusion, media campaigns, educational activities, etc.

20. A region-wide information system on DDT and malaria control will be the basis for gathering and disseminating data adequate to the needs of government in the decision-making process. Links with other regions of the world will facilitate the exchange of information related to malaria control, and the sharing and dissemination of the results of the demonstration projects on a world-wide basis. The electronic platform developed during the PDF B phase includes a Web and an Intranet page. It will provide access to project documents, national reports, technical studies, reports of meetings and workshops, as well as results of demonstration projects and will facilitate communication among project participants.

21. In the demonstration projects areas, the population and environmental compartments (water, soil, sediment and biota), as well as the malaria programs personnel, will be monitored for exposure to DDT and newly introduced pesticides for malaria control. An inter-laboratory control program will be implemented to ensure that analytical results are reliable and comparable across the participating countries and at the international level. A current baseline of DDT exposure will be established in each demonstration project area. Training on exposure assessment techniques will be provided, including sampling and laboratory techniques. Exposure risk areas will be identified and mapped, and the generated data will integrate national and regional information systems. Epidemiological assessment of malaria personnel will be implemented in each participating country.. Educational and public information material will be formulated to raise awareness about the risks of exposure to DDT and other pesticides.

22. The outcomes of this project component address needs at several levels. Local health services will be strengthened and communities involved in demonstration projects will learn participatory and integrated techniques for malaria control and will become aware of DDT exposure hazards. National institutions in the health, environment and other sectors will establish links in formulating an integrated and preventive approach to malaria vector control. At the Global level, the documented experience of each demonstration project will constitute a set of malaria control techniques replicable in other parts of the world under similar ecological conditions. The estimate of costs for each demonstration project was based on the Mexican experience. Each country will contribute to this component through redirection of its budgetary malaria control program in the demonstration areas. Based on information provided by each participating country after definition of the areas where the demonstration projects will be implemented, the total cost of demonstration projects is estimated at US\$ 5,976,000. Of this amount, US\$ 2,214,000 will be provided by the countries and US\$ 564,000 by OPS (Table 2). The total cost of this component includes workshops and training of local technicians and community, assessment of all activities, and evaluation of results (for details see Annex E), of which GEF is requested to provide US\$ 2,214,000.

23. **Component 2:** *Strengthening of national institutional capacity to control malaria without DDT.* The objective is to strengthen national and local institutional capacities to control malaria with methods that do not rely on DDT or other persistent pesticides. The outcome of this component will be strengthened national capacities of malaria risk assessment, development of

analytical laboratory infrastructure, community participation and training regarding malaria vector control and pesticide management. The activities described in Annex E will provide the tools for countries to make well-informed decisions about malaria control based on new methods. National Action Programs aiming at decentralization and implementation of integrated methods will be reinforced. Government authorities of health, environment, and agriculture of the participating countries will have the opportunity to exchange and discuss the existing alternative strategies that will be tested and documented through the demonstration projects.

24. Laboratory analysis capacity for chemical assessment will be strengthened in Mexico (Universidad Autónoma de San Luis Potosí and Centro de Investigación y Estudios Avanzados del Instituto Politécnico Nacional - CINVESTAV – Unidad Merida), Guatemala (Laboratorio Unificado de Control de Alimentos y Medicamentos - LUCAM), Nicaragua (Centro para la Investigación en Recursos Acuáticos de la Universidad Autónoma de Nicaragua – CIRA/UNAM), Panama (Instituto Gorgas de Estudio de la Salud), Costa Rica (Laboratorio del Ministerio de Agricultura y Ganadería - MAG), El Salvador (Ministerio de Agricultura y Ganadería), and Central Laboratory of Belize.

25. The Geographic Information System which was developed during the PDF-B phase will include geo-referenced data on malaria control, population at risk, environmental and ecological factors related to vector distribution, malaria vector control interventions, health system coverage, etc. A specific GIS will be developed for use at local levels with selected indicators to monitor project data related to pesticide use and environmental and health impacts of DDT. These computerized tools will strengthen: the institutional capacities to monitor and disseminate information related to malaria control under integrated health/environmental approach; the regional capacity for epidemiological analysis the health workers; the national epidemiological surveillance systems; the regional epidemic forecasting and preparedness; and the detection of insecticide resistance, *inter alia*.

26. A substantive Final Report will be printed in book format and CD to disseminate the results of the project and the methodologies for malaria control without DDT tested in the demonstration projects. It will include maps of malaria risk areas, extensive descriptions of the methodologies and results of each demonstration project, the effects of DDT exposure documented during the implementation of this project. The document will provide national governmental institutions with the information needed to support the sustained phasing-out of DDT in public health programs.

27. Details of these activities and their related costs are shown in Annex E (Description of Project Activities and Costs). The electronic platform containing Webpage, Intranet, and GIS will be developed by the Special Program for Health Analysis (SHA) of PAHO which will facilitate the future maintenance and continuation of the services. A special effort aimed at the sustainability of these activities will be made by building local capacity. Specific detailed Terms of Reference for all contracted services will be prepared by HEP/PAHO in close consultation with UNEP during the first quarter of the project. The total cost of this component will be US\$ 1,244,000.

28. **Component 3: Elimination of DDT stockpiles.** This component will address the existing problem of stockpiles in six of the eight participating countries (Nicaragua and Honduras have already received international support for final disposal of their DDT stockpiles). All activities will be documented and management plans will be put into place to prevent further accumulation of stockpiles of pesticides. During the PDF-B, approximately 135 tons of DDT were identified in Belize (13 tons), Costa Rica (9 tons), El Salvador (6 tons), Guatemala (15 tons), Mexico (87 tons), and Panama (5 tons). The national inventories will be completed, including finding and quantifying evidence of DDT uses in agriculture or other sectors. All obsolete stocks in leaking containers will be repackaged and prepared for shipment. The objective of this component is to eliminate the existing DDT stockpiles, repack materials as required, and arrange ways to eliminate DDT in an environmentally sound manner consistent with the provisions of the Stockholm and Basel Conventions. The total cost of activities under this component is US\$ 490,000.

29. **Component 4: Coordination and Management.** A regional coordinator will be hired for this project under terms of reference established by the steering committee. The regional coordinator be hired by PAHO and be based in one of the participating countries. Each country will have a national coordinator, based in the PAHO country office, with the main tasks of organizing and coordinating all activities implemented in the demonstration projects, facilitating local community participation, and monitoring and evaluating all activities, results, and data generated by the demonstration projects. This component also includes three annual meetings of the steering committee, three regional meetings for planning and evaluation of activities, and three regional annual reports. The total costs are US\$ 1,575,000.

RISKS AND SUSTAINABILITY

30. Drawing on the experience gained during the PDF-B phase, when participants from the eight participating countries were brought together in regional meetings, several assumptions about inherent risks can be made. These include: the possibility of a large scale malaria resurgence; unexpected natural hazard phenomena (earthquakes and hurricanes) that could create difficult conditions for implementing the proposed vector control strategies; lack of adequate community participation in the demonstration projects; lack of capacity of national malaria control surveillance systems; persistent transmission of malaria in areas close to demonstration projects. These risks will be mitigated by monitoring them very closely and by the communication network which will be put into place and will facilitate rapid discussion and search for adequate solutions.

31. All participating countries are signatories of several international conventions and their governments have decided to use this project as an instrument to update and upgrade their malaria control programs for the benefit of public health, the environment and sustainable development. Consequently, significant co-financing is available in each of the participating countries which can ensure post-project sustainability of the initiatives developed in the course of

the project. Local communities will be involved in each demonstration project and public awareness on the problems related to DDT use will be the key factors for the sustainability of the new approaches to malaria vector control generated by this project.

32. Sustainability will also result from the integration of project activities with the ongoing work of participating institutions. For example, epidemiological surveillance of pesticide problems is already an integral part of the national health surveillance systems supported by national Health Ministries in most countries. The PLAGSALUD project has activities related to agricultural use of pesticides, community involvement and public awareness on pesticides. The integration among these projects will enhance sustainability of pesticide control strategies developed by the DDT phase out effort. At the local level the project will work through the existing health service structure, thus avoiding distorting host country activities and resource capabilities in an unsustainable way. Regional level activities that enhance local and national level capacities will be emphasized. This approach is consistent with the increasing emphasis on decentralization promoted by PAHO within the health sector throughout the region.

33. It is expected that the local level experience generated by the demonstration projects will form a model that will be adopted at country level and later can be applied at a global level. The "bottom-up" approach based on the active participation of local communities, government technical officers, NGOs and local level institutions is designed to bring the desired sustainability to the models introduced by this project.

STAKEHOLDER PARTICIPATION AND IMPLEMENTATION ARRANGEMENTS

34. The primary beneficiaries of this project will be: a) populations in poor rural communities who are affected by malaria, b) public sector institutions that have to deal with the malaria problem, and c) agricultural workers and health workers who have been exposed to DDT and would be again if DDT is reintroduced. All stakeholders will benefit from the incorporation of integrated malaria vector control principles into the existing framework of national health policies; the strengthening of the new strategies for malaria control without DDT or hazardous pesticides; the involvement and training of local communities in malaria vector control techniques; the elimination of the existing DDT stockpiles; improved inter-sectoral collaboration especially between the health and environment ministries; and the strengthening of health surveillance and pesticides monitoring systems. The Governments of the 8 participating countries, local NGOs, research centers, and universities have demonstrated their willingness to cooperate and coordinate activities during the implementation of this project. This proposal has been formulated with the active participation of representatives of the governments and other stakeholders. The final draft was presented and discussed during the 2nd Steering Committee Meeting in Mexico city.

35. One of the main strategies of this project is to strengthen local capacities to control malaria without DDT. Great emphasis will be given to strengthening civil society's role in addressing the problems caused by POPs and other pesticides, by integrating local NGOs, church groups, etc into meetings, workshops and planned actions related to the demonstration projects. The project will provide information and technical support to civil society initiatives by providing technical manuals and reports on Malaria control without DDT in an accessible language.

36. PAHO, due to its historic involvement in the region and its role in implementing activities under related projects, will be the lead regional Executing Agency. The Division of Health and Environment (HEP) in Washington D.C. PAHO headquarters will be responsible for the management of the project. PAHO will be implementing the actions with close participation of its local officers in each of the participating countries. Technical assistance will be provided by other PAHO units (Office of External Relations (DEC), Program on Human Resources Development (HSR), Special Program for Health Analysis (SHA), and Program on Communicable Diseases (HCT)). The lead institution responsible for project execution in each country will be the Ministry of Health. Additionally, the project will involve the Ministries of Environment and Agriculture, the Plagsalud national pesticide commissions, and the local health care systems, as well as civil society organizations such as NGO's, research centers, and universities.

37. The project will have a regional coordinator contracted by PAHO, living in one of the participating countries. Each country will have a national focal point for this project, appointed by the executing ministry, and a national technical coordinator to be contracted by PAHO in consultation with the governments and UNEP for the full 36 months of the project. A National

Operational Committee will be established in each participating country under the coordination of the national focal point, with the participation of the technical coordinator and representatives of community organizations and NGOs involved in the project. Its role will be to promote the active participation of all stakeholders and to advise on the orientation of the project. It will be co-chaired by the national focal point and technical coordinators and will be the mechanism for the coordination of national actions. A Regional Operational Committee will be formed by the national focal points (Ministries of Health and national technical coordinators) and will be chaired by the regional coordinator. This will be a technical body to discuss, plan and evaluate the technical activities of the project.

38. The Steering Committee will be composed by representatives of the Ministers of Health, PAHO, UNEP, CEC, CCAD, other relevant projects in the region and NGOs, as well as the national focal points and technical coordinators. This will be the highest organ of the project and will meet at least once a year to approve the workplans of the countries, the terms of reference of the demonstration projects, and provide advisory functions. Any significant change to programs and budgets must be approved at this level.

INCREMENTAL COST AND PROJECT FINANCING

39. Table 1 presents the baseline of this intervention and the incremental costs of achieving global environmental benefits. This is discussed in Annex A. Table 2 presents the project financing by components. this Significant co-financing are available for malaria control in the participating countries as seen in the letters of endorsement. CEC is contributing US\$ 200,000 to be directed to assessment of pesticides residues in the 2 demonstration project areas in Mexico. The estimated co-financing includes 2,214,000 from national budgets for malaria control programs specifically oriented to the population of the demonstration project areas. US\$ 654,000 are in kind contribution from PAHO (10% of 3 PAHO Technical Regional Advisors, 10% of 7 PAHO's PLAGSALUD Technical Support Agents, 5% of 7 PAHO National Environmental Health Advisors, 15% of PAHO's Environmental Health Advisor in Mexico, and 5% of 3 PAHO Supervisors. The total Cost of the project is estimated at US\$ 11,093,000 thousand, of which US\$ 7,495,000 are requested from the GEF.

Table 1 Baseline & Incremental Costs of achieving domestic & global environmental benefits

000 US\$	Baseline	Alternate	Increment
GLOBAL ENVIRONMENTAL BENEFITS	1,773	9,268	7,495
PDF-B phase	440	770	330
Comp. 1 Demonstration projects and dissemination	1064	4,476	3,412
Comp. 2 Strength. Natl capacity to ctrl malaria without DDT	64	1,308	1,244
Comp. 3 Elimination of DDT stockpiles	25	425	400
Comp. 4 Coordination and Management	180	1,465	1,285
Executing Agency overheads	0	824	824
DOMESTIC ENVIRONMENTAL BENEFITS	1825	1825	0
PDF-B phase	0	0	0
Comp. 1 Demonstration projects and dissemination	1500	1500	0

Comp. 2 Strength. Natl capacity to ctrl malaria without DDT	300	300	0
Comp. 3 Elimination of DDT stockpiles	25	25	0
Comp. 4 Coordination and Management	0	0	0

Table 2. Project budget summary and component financing (000 US \$)

COMPONENT	GEF	Co-financing			TOTAL
		PAHO	Government	CEC	
1. Demonstration Projects and Dissemination	3,412	150*	2,214**	200	5,976
2. Strengthening of national capacities to control malaria without DDT	1,244	364*			1,608
2. Elimination of DDT stockpiles	400	50*			450
4. Coordination and Management	1,285	90*	90*		1,465
SUB-TOTAL	6,341	654*	2,304		9,299
Project Support Costs – PAHO (13%)	824				824
PDF-B phase	330	100*	240*	100	770
TOTAL	7,495	754	2,544	300	11,093

* In kind contribution

** National budget for malaria control program in the demonstration areas

MONITORING, EVALUATION AND DISSEMINATION

40. The administrative, technical and financial reporting framework will be provided in the framework of the standard UNEP and GEF reporting protocols. Indicators will be implemented through the establishment and integration of monitoring tools into project components, as agreed by the Steering Committee. A monitoring and evaluation plan, consistent with GEF criteria, will be prepared by the PAHO and CEC, and submitted to the Steering Committee and UNEP. The objective of this monitoring is to contribute to improving, and, if needed, adapting management of work program activities as well as creating the basis for project evaluation. The work plan and terms of reference for project staff and consultants will be discussed and agreed at the first and second meetings of the Steering Committee. A post project implementation review will be undertaken by UNEP two years after the end of the project.

41. Incorporated into the action plan are specific components (see Components 1 and 2) which explicitly aim to promote and disseminate the experiences obtained through the project implementation process to the Mexican and Central American stakeholders and communities within the region. Program activities encourage and facilitate technology transfer and information dissemination through programs of public participation, stakeholder involvement, and

professional and community-based education and information dissemination. States and municipal governmental organizations, NGOs and citizen involvement in project execution will also contribute to the dissemination of information on specific technologies and techniques that contribute to the sustainable environmental management and public health development. Finally, the electronic platform with a web site and GIS will also facilitate the dissemination of the results of the project as well as the new strategies and techniques of malaria vector control.

42. The Final Report of this project will have a book format consisting of an extensive report on different strategies for malaria control without DDT under different ecosystems and socio-economic conditions, containing data and results from all the five project components, illustrated by data, maps and pictures showing and/or reflecting the following achievements:

- An established regional epidemiological information system for malaria control and related pesticide problems integrated into the national health surveillance systems of each country.
- Improved diagnosis of the effects of pesticides used in public health for the control of malaria in people and the environment in each country.
- Strengthened involvement at local, national and regional levels of NGO's, research institutions, and other civil society organizations on avoiding DDT reintroduction and supporting new strategies of malaria control.
- Strengthened reliance upon the results of the demonstration projects developed in the region, and strengthened promotion of these alternatives by organizations and institutions collaborating with this project.
- Established regional and local capacities to monitor and respond to DDT related problems in a multi-sectoral and coordinated fashion.
- Strengthened inter-institutional cooperation and dialogue on malaria problem-solving, with particular attention to improving the capacity of the health, environment, and agriculture sectors to counteract the more traditional set of interests involved in pesticide application policy.
- Achievement of pesticide policy reforms, in particular the banning of persistent pesticides.

TIMETABLE, WORKPLAN AND GEF DISBURSEMENT SCHEDULE FOR THE IMPLEMENTATION OF THE COMPONENTS AND ACTIVITIES (IN 000 US \$).

COMPONENT/ACTIVITIES	Duration of the Project - 36 months						Total
	6	12	18	24	30	36	
COMPONENT #1 – DEMONSTRATION PROJECTS AND DISSEMINATION							
9 Demonstration Projects of malaria control in 8 different countries/ecosystems	600	600	600	600	600	100	3,100
Local meetings for preparing community participation and training	40						40
Communication plan to promote public awareness on DDT and educational campaign		20		20		16	56
Implement Web and Intranet pages		25		25			50
Assessment of environmental, biota, and human exposure to DDT and newly introduced pesticides	20	20	20	20	20	20	120
DDT compounds risk evaluation and risk maps			10				10
Local meetings for annual evaluation project)		15		15		6	36
SUB-TOTAL: COMPONENT #1	660	680	630	680	620	142	3,412
COMPONENT #2 – STRENGTHENING OF NATIONAL CAPACITIES TO CONTROL MALARIA							
Workshop for government authorities of health, environment and agriculture (decision making personnel) to promote the new techniques for malaria control without DDT and create awareness on DDT hazards	30						30
Technical Manual with the main guidelines for malaria vector control without DDT to guide the demonstration projects	15						15
A total of 8 training courses (one in each Demonstration Project area) for health and environment personnel	32						32
Regional technical workshop to exchange experience and information on new approaches to malaria control	40						40
Improve laboratory analysis capacity	160		160		160		480
Strengthen reference centers for malaria control	60		60				120
Workshop for lab technicians on laboratory analysis standardization and quality control	30						30
Rapid test validation		30		20			50
Inter-laboratory quality control program and capacity building	50		50				100
Malaria surveillance system and exchange of information on malaria control		15					15
Travel fellowship for technical training		50					50
Implement GIS application and specific GIS	100		50		50		200
Travel and local meetings for technicians to exchange experience on alternative malaria vector control techniques		16		16			32
Publication of the Final Report on strategies for malaria control without DDT (book and CD format)					25	25	50
SUB-TOTAL: COMPONENT #2	517	111	320	36	235	25	1,244
COMPONENT #3 – ELIMINATION OF DDT STOCKPILES							
Repack and elimination of stocks (Belize, Costa Rica, El Salvador, Guatemala, Mexico, and Panama)	200	200					400
SUB-TOTAL: COMPONENT #3	200	200					400

COMPONENT/ACTIVITIES	Duration of the Project - 36 months						Total
	6	12	18	24	30	36	
COMPONENT #4 – COORDINATION AND MANAGEMENT							
Regional coordination and supervision	45	85	80	80	60	50	400
8 national project coordinators	103	123	123	123	123	65	660
3 Steering Committee meetings	30			30		30	90
3 Regional Technical meetings for planning and evaluation (Operational Committee)		40		40		40	120
3 Regional annual reports with results and geo-referred data		5		5		5	15
SUB-TOTAL COMPONENT #4	178	253	203	278	183	190	1,285
SUB-TOTAL: PROJECT COMPONENTS							6,341
PROJECT SUPPORT COSTS – PAHO (13%)							824
PDF-B PHASE (already disbursed)							330
TOTAL GEF							7,495

LIST OF ANNEXES

- Annex A: Incremental Costs Analysis of the Project “Regional Program of Action and Demonstration of Sustainable Alternatives to DDT for Malaria Vector Control in Mexico and Central America”**
- Annex A1: Letters of endorsement**
- Annex B: Logical Framework Matrix**
- Annex C: STAP Roster Technical Review**
- Annex C1: Response to STAP/Council/IA comments**
- Annex D: Outline of the Root Causes of the Contamination of the Environment by DDT in Mexico and Central America**
- Annex E: Detailed Description of Project Activities and Costs to the GEF**
- Annex F: Demonstration Projects: Objectives, Strategies, and Activities**