WHO-EM/MAL/374/E

Mid-term review

Demonstration of sustainable alternatives to DDT and strengthening of national vector control capabilities in Middle East and North Africa

World Health Organization
Regional Office for the Eastern Mediterranean

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ABBREVIATIONS

ASP	Africa Stockpiles Program
BMGF	Bill & Melinda Gates Foundation
COMBI	Communication for behavioural impact
DDT	Dichlorodiphenyl trichloroethane
DSSA	Demonstrating and scaling up of sustainable alternatives to DDT
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environmental Facility
GEFSEC	Secretariat of the Global Environment Facility
IEC	Information, education and communication
IRS	Indoor residual spraying
ITN	Insecticide treated nets
IVM	Integrated vector management
LLIN	Long-lasting insecticidal nets
LSHTM	London School of Hygiene and Tropical Medicine
LSTM	Liverpool School of Tropical Medicine
M&E	Monitoring and evaluation
MOH	Ministry of Health
NGO	Nongovernmental organization
NIP	National Implementation Plan for the Stockholm Convention
NMCP	National malaria control programme
PDF	Project development facility
POP	Persistent organic pollutant
PSMS	Pesticides stock management system (of FAO)
QSP	Quick start programme (of SAICM)
RCT	Randomized controlled trial
SAICM	Strategic Approach to International Chemicals Management
STAC	(Regional) Scientific and technical advisory committee
UNEP	United Nations Environment Programme
VCNA	Vector control needs assessment
WHO	World Health Organization

EXECUTIVE SUMMARY

This is the mid-term review of the Global Environmental Facility (GEF) Project "Demonstration of Sustainable Alternatives to DDT and Strengthening of National Vector Control Capabilities in Middle East and North Africa". The participating countries are Djibouti, Egypt, Islamic Republic of Iran, Jordan, Morocco, Sudan, Syrian Arab Republic and Yemen. The overall project costs are US$ 13.02 million of which US$ 3.96 million is in the form of a GEF grant. The Project began on 9 February 2009; the completion date was initially on 31 October 2013, but after approval of a no-cost extension, the new completion date is 31 December 2014.

The Project's objectives are: (i) to reduce the negative effects of DDT in public health and the global environment through the introduction of sustainable, cost effective and environment friendly alternative interventions; and (ii) to reduce the reliance on DDT in case of outbreaks of vector borne diseases and to minimize the potential to revert to DDT use. The project has five components in accordance with its expected outcomes: (i) demonstration of DDT alternatives; (ii) capacity-building on integrated vector management (IVM); (iii) disposal of persistent organic pollutant (POP) pesticides; (iv) information sharing on good practices; and (v) coordination, monitoring and evaluation.

The Project's rationale was that there is a risk that Project countries, with their long history of DDT use and large available stocks of this insecticide, could decide to revert to the use of DDT for disease vector control, especially since the evidence base on alternative interventions and the capacity for sound decision-making is weak. Hence, increasing the evidence base, disposing of stocks, and strengthening national capacity for analysis and decision-making on regulations and operations would support a sustainable transition away from DDT. Success, in the context of the Stockholm Convention, would most directly be measured by the reduced likelihood of countries to re-introduce DDT, and by the reduced stocks of DDT available in countries. The WHO promotes IVM as the preferred approach for improving national vector control systems. IVM aims to improve the efficacy, cost-effectiveness, ecological soundness and sustainability of disease vector control.

In the PDF-B phase, important achievements were: an established coordinating mechanisms at national and regional level, preliminary POPs inventories and completed vector control needs assessment and action plans in each Project country. The Project built on the positive results from the PDF-B phase. The Project is consistent with the UNEP/WHO global programme called Demonstrating and Scaling up Sustainable Alternatives to DDT in Vector Management (DSSA), and is complementary to the NIP process and to FAO's Africa Stockpiles Program (ASP).

This mid-term review, as per its terms of reference, was a supportive review rather than a systematic evaluation. The review relied mostly on desk study of available documentation and data sets, whereas in-country visits for evaluation purposes were outside the scope of this assignment. Performance in each Project Component was reviewed and recommendations for the second term were given.

COMPONENT 1: DEMONSTRATION OF DDT ALTERNATIVES

This component has received the largest part of human and financial resources, and has greatly benefited from the assistance of international experts. The demonstration projects have made substantial progress to date, with well-designed studies, successful rolling-out of interventions, sound systems of epidemiological and entomological surveillance in place in several countries, and promising preliminary data on cost-effectiveness. The interventions studied in individual countries are: The use of lids to cover water reservoirs to control breeding of urban malaria vectors (Islamic Republic of Iran); evaluating efficacy of long-lasting insecticidal nets (LLIN) and indoor residual spraying (IRS) in the control of leishmaniasis (Morocco); comparison of LLIN+IRS with LLIN alone in controlling malaria in situations with and without insecticide resistance (Sudan); and comparison of LLIN+IRS with LLIN alone in controlling malaria (Yemen).

The individual studies have shown a large variation in their implementation status, with the abandoned project in the Syrian Arab Republic on one end of the spectrum and the impressive research effort in Sudan on the other. It is expected that the studies will make an important contribution to the evidence base on alternatives to DDT, showing the effect of alternatives on disease prevalence and/or entomological parameters. This evidence, which was largely lacking prior to implementation of the Project, will provide countries with a better basis for decision-making on alternative products and methods of vector control, thus reducing the tendency to revert to use of DDT. An inevitable limitation of the studies is that direct comparisons with DDT on cost-effectiveness could not be made due to the zero-use of DDT at baseline in all Project countries.

The actual number of demonstration projects mentioned in the Project's logical framework was 16. Following the assessment of the situations in each country, however, the Regional Scientific and Technical Advisory Committee (STAC) reduced this target from 16 to 5 studies, each representing a medium to large-scale randomized controlled trial. Three countries were not earmarked for demonstration projects because of insufficient available capacity. In the remaining five countries, only one demonstration study was implemented per country, because of the size of the studies and because of available resources. The project in the Syrian Arab Republic was discontinued due to the security situation. The study in Sudan is by far the largest, which is justified by the disproportional high disease burden and major problems with insecticide resistance experienced by this country. Shortcomings in the studies are discussed and suggestions for improvement are given.

COMPONENT 2: CAPACITY-BUILDING ON IVM

The demonstration of cost-effective alternatives to DDT for vector control should not be a stand-alone activity but be part of a more broad-based management approach that aims to optimize available resources for vector control. This approach should be supported by policy and institutional arrangements and be facilitated by adequate capacity-building activities at all levels. Hence, it is essential that the Project invests in the strengthening of the capacity of countries for implementation of integrated vector management (IVM) in the broad sense. Indeed, without capacity strengthening on IVM, it is likely that the positive results of demonstration projects on cost-effectiveness will not be effectively adopted, adjusted, implemented and evaluated by countries.

The Project's progress reports noted significant advances in the development of policy and regulatory control, institutional arrangements and advocacy on IVM and/or pesticide management, but a lack of progress was reported in relation to training. It is worth noting that for implementation of Component 2, the Project has not received the external technical support to the extent as for Components 1 and 3. The progress at the policy and institutional level achieved with co-funding support is a promising result because it signals national commitment to the concepts of IVM and/or pesticide management. Nevertheless, there are some concerns that need to be addressed by the Project in the years ahead. A particular concern is that detailed documentation on activities and achievements under Component 2 is mostly lacking. As a consequence, it remains difficult to estimate the actual capacity for IVM implementation that has been developed since the baseline. The pre-determined indicators alone are not sufficient but need to be supplemented with more descriptive narrative related to the functioning of the newly established policies, structures or capacities. For example, a vector control unit may have been established, but it is also important to know whether the unit has been mandated and empowered to harmonize the activities of existing vector control programmes. Also, countries should revisit their vector control needs assessment (VCNA) and determine how their achievements under Component 2 have addressed the gaps identified at baseline or, which shortcomings have not been adequately addressed. In the second term, the Project should also give increased attention to training on the management aspects of vector control in the broad sense and to the involvement of relevant stakeholders in IVM.

COMPONENT 3: DISPOSAL OF POP PESTICIDES

The Project has gone through a systematic process of selecting priority countries, carrying out capacity-building, inventories, and (in some countries) centralization and safeguarding of POP pesticides. In implementing Component 3, the Project has greatly benefited from the expertise of FAO. Despite the delayed start of the Letter of Agreement due to administrative reasons, good progress has been made in the past two years. The activities in the priority countries are on track and the tender process has resulted in a contract for safeguarding, shipment and disposal. The safeguarding and disposal are expected to be completed in 2013. It is unfortunate that the disposal costs are much higher than those estimated at the beginning, necessitating a major re-allocation of funds from other Project components to Component 3.

The activities under Component 3 are a good example of multi-stakeholder planning and implementation. Government funding and in-kind contributions were mobilized in the capacity-building, inventories, centralization and safeguarding. In Morocco, the Project activities were efficiently planned to complement the activities under the ASP and Strategic Approach to International Chemicals Management/Quick start programme (SAICM/QSP).

The Project's log frame presented two indicators for outcomes of Component 3. The first indicator is "Up-dating of the inventories of all POP pesticides in the 8 participating countries completed". This indicator needs revision because it was decided early in the Project that the updating of inventories was required only in two of the priority countries, not in all eight Project countries, because only in priority countries the Project would be able to support the disposal of POP pesticides. The second indicator refers to "the

collection, repackaging, and disposal of at least 100 tonnes of POP pesticides from 4 countries not covered by the ASP". The Project is well on its way towards disposal of 120 tonnes of POP pesticides and waste. Disposal is conducted for 3 countries, not 4, and justification has been given for not including disposal in the other five countries.

COMPONENT 4: INFORMATION SHARING ON GOOD PRACTICES

Activities that were proposed under Component 4 are the preparation of reports and web pages to give wide dissemination to the outcome of the national studies, the regional analysis, and lessons learnt in the Region's main languages. These activities were planned for the final financial year and, thus, can only be assessed in the final evaluation. Nonetheless, there has already been some progress reported by mid-term. Two articles have been published on the situation and achievements with regard to policy development for IVM and pesticide management. Moreover, several technical publications will be forthcoming from the demonstration projects.

To facilitate the dissemination of information and experiences between countries, the STAC proposed to establish a roster of regional experts, but details on the roster, how it will be used to benefit other countries, and how it will be managed beyond the end of the Project, still need to be worked out. Another point requiring attention in the second term is that dissemination should be accompanied by technical and operational guidance on how to transfer the results obtained in one country to countries with different eco-epidemiological and operational settings.

COMPONENT 5: COORDINATION, MONITORING AND EVALUATION

The Project's diverse activities covering eight countries demand a major role for coordination, monitoring and evaluation. A full-time Project coordinator and Programme Assistant (Secretary) were assigned in March 2009, and a full-time Assistant Technical Project coordinator was filled from August 2010 till September 2012. These three coordinator positions were made available by the WHO Regional Office for the Eastern Mediterranean and the Government of Sudan, as co-financing contribution to the Project. Eight national project coordinators were assigned in June 2009, to coordinate country activities. However, communication with, and response from, National project coordinators from several countries has been rather poor. Apparently, the current mechanism for communication and response should be revisited by the Project in order to make improvements. National steering committees were established in Project countries during the PDF-B phase to oversee and guide the implementation at national level and to carry out monitoring and evaluation. However, documented information regarding meetings and the functioning of national steering committees in Project countries is very limited.

The Regional Scientific and Technical Advisory Committee (STAC) was established to provide overall guidance to implementation of the Project's activities and to conduct annual reviews of project progress. Five STAC meetings with adequate representation from project countries were held in the first term. The benefits of the STAC have so far been manifested in several ways. The STAC has provided: continuity in monitoring and evaluation; a forum for development of methodology for demonstration projects; coordination and guidance on project activities; and opportunity for capacity-building;

and inter-agency collaboration due to the participation of experts from universities and FAO. Upcoming STAC meetings should facilitate on-site visits of participants to demonstration projects.

FINANCES

Revisions have been made in the budget allocations to consultants, sub-contracts, trainings, meetings, equipment, reporting and evaluation. Most notably, the consultant budget line on obsolete POPs has been substantially increased in order to allow for disposal of increased quantities of POPs. Also, an increase has been made in the allocation for STAC meetings, due to high costs. The amendments appear to be appropriate and have been made to support effective project implementation. Overall, 73% of GEF funds have been spent. Available information indicates that co-financing has so far been provided as needed. An updated strategy should be made for the best use of the remaining budget and its allocations for monitoring and evaluation, meetings, training courses, national seminars and reporting. This would help ensure that the benefits of demonstration projects, IVM capacities, and information sharing are maximized, while taking into account the findings and recommendations of this mid-term review.

SUSTAINABILITY

The sustainability of the Project's outcomes will be manifested at several levels. The political will to implement alternative vector control methods in the context of an IVM strategy has been demonstrated but active implementation of new IVM policy needs continued emphasis under Component 2. The IVM approach, aiming to increase the efficiency and cost-effectiveness of vector control, will contribute to financial sustainability. A concern for long-term sustainability, however, is the development of insecticide resistance, in view of the continued reliance on insecticidal vector control methods (mainly IRS and LLIN). Resistance development may already be compromising the effectiveness of interventions in the demonstration studies, as has been noted in Sudan. This problem is at the forefront of contemporary malaria control. Some respite may be offered through early detection of resistance and the preventive rotation of chemical classes used in IRS; these activities should be continued through the ongoing collaboration with Liverpool School of Tropical Hygiene. It is unfortunate that non-chemical methods such as environmental management have not been incorporated in the demonstration projects in Morocco and Sudan. Since the study design cannot be altered at this stage, it is recommended that observations related to environmental management are incorporated in the studies, thus anticipating their relevance for future strategies. Also, further attention is needed on people's perceptions, acceptance and compliance with the introduced interventions.

REPLICABILITY

Opportunities for replication have been created by the Project through adoption of a regional approach and through detailed situation analysis in countries conducted at baseline. The demonstration projects use some interventions that are relatively easy to replicate and scale up. The wide-scale application value of other interventions, notable the combination IRS+LLIN, is less straightforward, particularly when the development of insecticide resistance is taken into consideration. This suggests that appropriate studies

should be conducted in each new country before replicating these interventions. In view of the sources of variation, an IVM strategy should embrace an adaptive management approach, in which the choice of interventions can be changed if the situation so dictates. Randomized controlled trials are useful for interventions with a wide application value, but interventions with variable effects demand an intuitive, adaptive management approach within the context of operational programmes. Consequently, the question is not only whether the use of certain interventions can be replicated, but also whether the adaptive management approach of IVM can be replicated. It is recommended that the Project will make innovative advances in establishing, testing and documenting this adaptive approach in an operational setting. This approach should be supported by appropriate training.

STAKEHOLDER INVOLVEMENT

The policies and programmes of various sectors have a bearing on the risk of vector-borne diseases, often unintentionally. These sectors influence the breeding of vectors or the contact between vectors and humans and should thus be involved as stakeholders in the Project. Key stakeholders in each project country had been identified during the PDF-B phase, and were represented in national steering committees. Country ownership has been created with activities on policy development, institutional arrangements, and capacity-building on IVM and pesticide management. The demonstration projects have depended on advice and technical inputs from international experts, but project ownership over the design and implementation remained with the countries themselves.

1. INTRODUCTION

1.1 Project rationale and background

1.1.1 Project rationale

The Eastern Mediterranean Region of the World Health Organization (WHO) makes a substantial contribution to the global burden of vector-borne diseases. Its global contribution to the disease burden is 4.1% for malaria, 8.5% for schistosomiasis, 14.2% for leishmaniasis, 1.3% for lymphatic filariasis, 2.8% for onchocerciasis, 4.2% for dengue, and 15.6% for trachoma (*1*,*2*).

Vector control constitutes a major component in the control or elimination of these vector-borne diseases. Vector control in countries has relied predominantly on the use of chemical insecticides. The Eastern Mediterranean Region has reported an annual use of 47 tonnes (t) of organophosphates, 5 t of carbamates and 22 t of pyrethroids for disease vector control (as active ingredient; or 3.4, 16.7 and 5.3% of the global reported use for disease vector control, respectively); these figures exclude the use of chemicals for insecticide-treated nets (*3*).

Countries in the Region have a long history of use of the persistent organic pollutant (POP) DDT for control of malaria and leishmaniasis. During the past decade, however, no country has reported the use of DDT for disease vector control (*3*). Nevertheless, many countries still have large usable or obsolete stocks of this insecticide. Hence, the occurrence of epidemics of malaria or other vector-borne diseases could trigger countries, especially resource-poor countries, to revert to the use of DDT.

Potential driving forces for countries to revert to DDT are the development of resistance in vector populations to the insecticides currently used, the perceived high cost-effectiveness of DDT, few chemical molecules available for rotation in resistance management schemes, and the trend set by some countries in the African Region of re-introduction of DDT. Two countries, Morocco and Yemen have notified the DDT Register of the Stockholm Convention Secretariat of their intention to use DDT (*4*).

The Project being reviewed was based on the notion that countries which decide to use, or re-introduce, DDT may not be choosing for the best available option – in terms of efficacy, cost-effectiveness, and human and environmental safety. The root problem identified during the development phase of the project (PDF-B) was that countries have inadequate capacity for evidence-based decision-making on vector control in accordance with the principles of integrated vector management (IVM) (*5*) and sound management of pesticides (*6*). In particular, evidence has been lacking on the cost-effectiveness of alternative products, methods and strategies to the use of DDT.

Increasing the evidence base and strengthening national capacity for analysis and decision-making on regulations and operations would reduce the risk that countries revert to DDT in case of disease epidemics and, thus, would support a sustainable transition away from DDT. Success, in the context of the Stockholm Convention, would most directly be measured by the reduced likelihood of countries to re-introduce DDT (see section 1.2.1), and by the reduced stocks of DDT available in countries.

1.1.2 IVM

The WHO Regional Office for the Eastern Mediterranean promotes IVM as the preferred approach for improving national vector control systems. IVM is defined as "a rational decision-making process for the optimal use of resources for vector control" (*7*). Its aim is to improve the efficacy, cost-effectiveness, ecological soundness and sustainability of disease vector control. The main elements of an IVM strategy are (i) advocacy, social mobilization and legislation; (ii) collaboration within the health sector and with other sectors; (iii) an integrated approach; (iv) evidence-based decision-making; and (v) capacity-building. These elements should be supported by legislation and regulation.

At the core of IVM is an evidence-based, integrated, management approach to vector control. Use of a range of vector control interventions is promoted – alone or in combination – selected according to local knowledge about the vectors, diseases and their determinants. The IVM approach is applicable to multiple diseases, because some vectors can transmit several diseases and some interventions are effective against several vectors. IVM strategies reduce the pressure imposed by insecticides to select for insecticide resistance and involve use of tools and resources from sectors other than health.(*8*)

1.1.3 Project background

The project was conceived during regional meetings in Tunisia and Jordan organized by WHO in 2003. The Global Environment Facility (GEF) approved US$ 650 000 for a PDF-B phase in 2005, and project development activities were implemented in eight countries in 2006 and 2007. Major outcomes of the PFD-B phase: were the establishment of national coordinating mechanisms on vector control; development of a tool for vector control needs assessment (VCNA); completed VCNAs by each country; and development of IVM action plans by each country.

These results revealed the urgent need to strengthen national vector control systems and this required investment in capacity-building. The results also suggested that obsolete stocks of POP pesticides used for public health and agriculture purposes needed to be dealt with. Project countries furthermore identified the need for involvement of stakeholders from sectors other than health and for a transition from vertical, centralized vector control programmes towards decentralized programmes with increased participation of communities.

The established coordinating mechanisms at national and regional level together with the completed VCNAs and action plans effectively provided for an appropriate basis for starting a full-sized project. A regional project proposal was written and consolidated, and on 7 July 2008 the GEF endorsed the project proposal for US$ 3 960 000 in financing in addition to what was provided for the PDF-B. The official starting date was 9 February 2009. The project completion date was initially set at October 2013, but after an amendment made in February 2013, the new completion date was set at December 2014.

1.1.4 Relevance to other GEF programmes

The Project is consistent with the UNEP/WHO global programme called Demonstrating and Scaling up Sustainable Alternatives to DDT in Vector Management (DSSA), which aims at protecting human health and the environment by decreasing the use of DDT disease vector

control. The DSSA programme emphasizes the importance of linkages between its projects, to take advantage of developed protocols, outputs and lessons learnt. As pointed out in the Project Document of the reviewed project, significant differences exist between regions in epidemiology and ecology of disease and disease transmission which limits the potential for straightforward extrapolation of protocols and lessons learnt between regions and indicates the value of local adaptation.

The Project is complementary to the development process of the national implementation plans (NIP) for the Stockholm Convention in countries, and there is prospect for incorporating Project outputs in the implementation of NIPs. By collaborating with the Food and Agriculture Organization (FAO), the Project aims to safeguard DDT stockpiles and POPs-containing wastes in those Project countries that are not already covered under a separate FAO project, i.e. the GEF co-funded Africa Stockpiles Project (ASP). Moreover, the Project being reviewed capitalizes on the existing collaboration between WHO and FAO on promoting the implementation of the Code of Conduct on the Distribution and Use of Pesticides and on the management of obsolete pesticides.

1.1.5 Executing arrangements

The Project takes advantage of the unique position of the WHO as executing agency through its institutional structures, international reach and leadership role in vector-borne disease control. The WHO advises and supports countries in their national strategies and action plans for decreasing the disease burden. Moreover, the WHO is actively promoting IVM and the sound management of pesticides as strategies to reduce the risks posed by public health pesticides, including DDT, to human health and the environment. Specifically, the Regional Office has been providing support for the implementation of IVM and sound management of pesticides to countries in the Region through capacity-building, provision of technical guidelines and strengthening of vector control services.

1.2 Project design

1.2.1 Project goal and objectives

The overall goal of the project is: “Demonstration of regional and ecosystem specific alternative approaches to vector borne diseases control as contribution to the formulation of (and in line with) UNEPs global DDT project related portfolio promoting a global vector borne diseases control policy without the application of DDT through the use of sustainable, cost effective and environment friendly alternatives.” “The environmental objective is to reduce the negative effects of DDT in public health and the global environment through the introduction of sustainable, cost effective and environment friendly alternative interventions. The development objective is to reduce the reliance on DDT in case of outbreaks of vector borne diseases and to minimize the potential to revert to DDT use.”

The zero-use of DDT by project countries at baseline has posed a challenge for setting the impact indicators of the environmental objective and developmental objective for the project. The project document states: “In case all participating countries decide to revert to the use of DDT, and based on the very limited figures from several countries concerning DDT use in the past as regular vector control measure, it is estimated that this will result in an annual

DDT use of at least 300 ton/year in malaria vector control only." This figure has allowed the project to measure impact by assuming the rather hypothetical increase from 0 to 300 tonnes per year over the project period in the counterfactual scenario (without the project).

The weakness of this measure, however, is that future use of DDT will be highly dependent on the occurrence and severity of outbreaks in project countries. In the absence of outbreaks, the expected use of DDT will be zero, irrespective of the performance of the Project. Consequently, the measured impact in terms of a reduction in DDT use relative to the projected figure is not necessarily attributable to the Project.

Therefore, it is **recommended** that the Project explores alternative ways to measure impact on DDT use. A suggestion is given here. Since the Project's objective is to reduce the reliance on DDT in case of outbreaks and to minimize the potential to revert to DDT use, impact could be determined by measuring the likelihood of individual countries to revert to use of DDT in case of disease outbreaks. This likelihood could be determined at (baseline,) mid-term and at the end of the project through standard interviews with policy makers, decision-makers and programme managers. This could be attempted by identifying parameters that determine the likelihood of use of DDT, for example: the perceived advantages and disadvantages of DDT; the level of resistance to insecticides currently used for vector control; available options for insecticide rotation; perceived obstacles in terms of public acceptance, health sector acceptance, and export of goods; the information obtained from other countries using or producing DDT; as well as the occurrence of disease outbreaks. Using this approach (which will be a study on its own), the impact attributable to project interventions could be separated from the unpredictable occurrence of outbreaks. If remaining time in the project allows, this approach could be still be piloted in selected countries in two consecutive years for the potential benefit of other projects in the DSSA global programme.

1.2.2 Project outcomes

The project aims to build upon on-going efforts at national and international level to: (i) demonstrate viability, availability, sustainability and cost-effectiveness of the vector control alternatives to DDT, based on principles of IVM; (ii) strengthen national capacities for the planning, implementation and evaluation of the application of alternatives to DDT based on the principles of integrated vector management; (iii) to collect, repackage and dispose stockpiles of obsolete POPs; and (iv) disseminate good practices, demonstrated alternatives and lessons learned in the participating countries.

In accordance, the Project's logical framework outlines five outcomes:

1. Viability, availability, sustainability and cost-effectiveness of alternatives to the use of DDT demonstrated
2. Capacity built in each country to plan, implement and evaluate the application of alternatives based on the principles of IVM
3. Collection, repackaging and disposal of POP pesticides used in public health and agriculture completed
4. Information on good practices and demonstrated cost-effective and sustainable alternatives are taken up by national institutions and in planning processes

5. Trans-boundary coordination, information sharing and monitoring and evaluation mechanisms operational and effective in promoting IVM without the use of DDT

These project outcomes and the order in which they are presented provide an appropriate framework for project activities by addressing the major issues at hand. A cross-cutting component necessary to achieve the specific objectives above is programme coordination and management.

1.2.3 Project outputs and activities

The project has five components with their outcomes as stated in the approved Project Document are outlined below:

Component 1. Viability, availability, sustainability and cost-effectiveness of alternatives to the use of DDT demonstrated

- Output 1.1: A protocol formulated by the National Steering Committee, following guidance from the Regional Office with on-site review by an international expert completed for each participating country.
- Output 1.2: Specific capacity-building carried out that may be required for successful implementation of the protocol, based on the needs identified in the demonstration project proposal.
- Output 1.3: Regional workshop conducted for the harmonization of the country protocols with effective follow-up for the completion of the protocols, and final review by the (Regional) Scientific and Technical Advisory Committee (STAC).
- Output 1.4: Assistance provided to the national project coordinators for essential elements of demonstration projects implementation in line with the agreed protocols.
- Output 1.5: Project activities monitored through screening of annual reports by the National Steering Committee and STAC and by on-site visits to demonstration projects by STAC members, and dissemination of observations and recommendations.
- Output 1.6.1: Technical support (through consultancies) provided for the analysis of datasets, including cost-effectiveness and sustainability analysis, and the production of the final report.
- Output 1.6.2: STAC meeting held to review the national reports and draft the consolidated regional report, including lessons learnt, for submission to relevant parties.

Component 2. Capacity built in each country to plan, implement and evaluate the application of alternatives based on the principles of IVM.

- Output 2.1: National seminars organized for the review of policy and legal frameworks
- Output 2.2.1: Promotional documents produced, country visits conducted and national seminars organised, provision of examples and case studies of successful institutional arrangements between the sectors completed.

- Output 2.2.2: Existing local health services, agricultural extension services and farmer field schools are used to channel messages on IVM and the sound management of pesticides to rural communities.
- Output 2.3: National vector control units are restructured to ensure that all essential IVM functions are performed well at all levels. Technical cooperation in the area of program management provided as needed.
- Output 2.4: Guidelines and training materials for vector control professionals are developed, updated and reviewed.

Component 3. Collection, repackaging and disposal of POP pesticides used in public health and agriculture completed.

- Output 3.1: Obsolete POP pesticides used in public health and agriculture are collected, repacked and disposed.

Component 4. Information on good practices and demonstrated cost-effective and sustainable alternatives are taken up by national institutions and in planning processes.

- Output 4.1: Report and/or article for peer reviewed literature is published, trilingual web page is designed and publicly available to give wide dissemination to the outcomes of the national studies.

Component 5. Trans-boundary coordination, information sharing and monitoring and evaluation mechanisms operational and effective in promoting IVM without the use of DDT.

- Output 5.1: (Part-time) Project Coordinator assigned by WHO, Assistant Technical Project Coordinator recruited and eight national project coordinators assigned; trans-boundary and national coordination, information sharing, monitoring and evaluation assured.
- Output 5.2: Establishment/functioning of a National Steering Committee in each participating country
- Output 5.3: Establishment/functioning of a Regional Scientific and Technical Advisory Committee

1.2.4 Project timeline and budget

The project duration was initially for 60 months starting substantively in May 2006, when the Regional Project Coordinator assumed duties. The end date was initially set at October 2013. However, after an amendment made in February 2013, a no-cost extension was made with a new completion date of December 2014.

The total budget of the Project (excluding the PDF-B) is US$ 12 376 416 of which US$ 3 960 014 was committed by the GEF. The involved governments from the project countries committed to providing the remaining US$ 7 210 902 through in-kind and cash funding.

1.3 Mid-term review: objective, scope and methods

1.3.1 Objective

This mid-term review was commissioned by the WHO Regional Office for the Eastern Mediterranean, to be carried out within the period from 20 November 2012 to 31 March 2013. The main purpose was to provide a supportive review of the Project. The objective of the mid-term review was to establish whether implementation of the project is on track and whether corrective action is needed towards fulfilling the objectives and outcomes by the end of the Project.

1.3.2 Scope

The terms of reference of the mid-term review were to conduct:

1. desk study of project document and GEF requirements for mid-term review;
2. desk review of output reports (country progress reports, action plans, meeting reports, meeting presentations, mission reports, data sets, quarterly project progress reports, GEF review reports);
3. assessment of outputs in relation to expected results of each project component;
4. assessment of cooperation of countries in each project component;
5. assessment of functioning of committees;
6. evaluation of timetable of activities and allocation of financial resources (causes for delays; propose remedial actions);
7. evaluation of programmatic and financial adjustments that have been made;
8. evaluation of project coordination and management;
9. evaluation of scientific quality of outputs;
10. assessment of co-financing support;
11. prognosis of outcomes in the second half of the project;
12. description of lessons learnt;
13. rating of project success;
14. production of review/evaluation report.

1.3.3 Methods

The methods used were:

1. desk review of available documents and data sets;
2. consultations with project staff and UNEP staff (telephone, Skype, email);
3. consultations through questionnaires for national coordinators; responses were received from Djibouti, Egypt, Islamic Republic of Iran, Jordan, Morocco, Sudan and Yemen;
4. distribution of draft report to main Project stakeholders, feedback from stakeholders, and incorporation of inputs in the revised document.

1.3.4 Limitations

Being a supportive review rather than a systematic and in-depth evaluation, this mid-term review relied mostly on desk review of available documentation and data sets. Consultation with national coordinators was conducted through questionnaire, but in-country visits for

evaluation purposes were outside the scope of this assignment. Consequently, details on performance that have not been adequately documented may have been missed in the mid-term review. In response, this review identified topics and areas that need more detailed documentation and/or description in the form of case studies.

2. PROJECT PERFORMANCE TO DATE

2.1 Component 1: Viability, availability, sustainability and cost-effectiveness of alternatives to the use of DDT demonstrated

2.1.1 Background

The testing of alternative methods of vector control in operational settings has been considered to be the main component of the Project, receiving the lion's share of human and financial resources. The Project specifies the need for international experts on intervention studies and cost-effectiveness analysis to ensure scientific rigour in the design and in analysis of results. Component 1 built upon country proposals that had been prepared during the PDF-B phase. Protocols of activities were prepared and harmonized; capacity was built on cost-effectiveness analysis tools; and experimental trials were implemented.

2.1.2 Formulation and harmonization of national protocols

In the PDF-B phase, Project countries had prepared proposals for demonstration projects during the PDF-B phase. As part of the Project, the proposals were further developed into protocols detailing the methods and activities, roles of national partners, mechanisms and indicators for monitoring and evaluation (M&E), and reporting.

In the first STAC meeting, a protocol template was agreed upon, and each country selected the vector-borne diseases that were considered to be a target for DDT. For preparing national protocols, countries were advised to provide clear objectives with entomological and epidemiological indicators, and to maximize the use of current/alternative interventions to reduce the reliance on the use of pesticides. A list of outcome and impact indicators was produced to assist countries in their development of protocols. Some countries adjusted their plans, e.g. according to the recent emergence of leishmaniasis in specific areas. The protocols were consolidated at country level and were subsequently submitted to WHO. In Yemen, the development of the protocol was delayed until 2011.

The Project emphasized the value of the regional approach in the demonstration studies. This is important because the initial findings showed that disease prevalence and incidence rates were low, which will limit the strength of results from individual Project countries. Hence, the STAC suggested that the regional approach should allow for evidence to be comparable between countries so that the effects of alternative interventions on disease could be synthesized by pooling data from more than one demonstration projects, and so that the results could be useful to other countries in the Region (on the assumption that the studies are comparable between countries; see section 5). To achieve this, country protocols were harmonized, methods standardized and a template for the reporting format was produced. The harmonization was conducted during the second STAC meeting, in 2009. Countries were advised to incorporate the harmonized format into their projects.

2.1.3 Selection of priority countries

The protocols for demonstration projects had initially been developed by eight Project countries. However, during the second STAC meeting in 2010, five countries were prioritized for demonstration projects. These countries were: Islamic Republic of Iran, Morocco, Syrian Arab Republic, Sudan and Yemen. The selection of priority countries was a deviation from the Project's log frame that gave as outcome indicator for Component 1: "Number of mortal vector borne diseases in the demonstration areas in the 8 participating countries has been significantly reduced while no DDT has been applied".

The reason for not including Djibouti, Egypt and Jordan was that these countries were reported to have insufficient managerial and/or technical capacity available to implement the demonstration projects. The indicator in the log frame points to disease outcomes, which require major trials covering large human populations. Implementation of such large-scale trials in all eight countries may not have been realistic, considering the available human and financial resources in the Project. Instead, the Project anticipated that results from demonstration projects would benefit decision-making in other Project countries in spite of differences in eco-epidemiological conditions between countries.

2.1.4 Capacity-building for demonstration projects

Specific capacity-building was carried out in accordance with the requirements for successful implementation of the protocol. In the context of the demonstration projects, country teams had noted the need for training on entomological and epidemiological surveillance, species identification (e.g. sandflies), insecticide resistance monitoring, operational planning, field application and safety of insecticides and community awareness. This type of capacity-building is different from the more general capacity-building envisaged under the Project's Component 2 – the latter emphasizing operational and managerial aspects of IVM.

Two renowned scientific experts were contracted by the Project to assist in the implementation of Component 1: an expert on the design and data analysis of intervention studies from the London School of Hygiene and Tropical Medicine, UK, and an expert on cost-effectiveness analysis from Tulane University, USA.

A regional training workshop was conducted back-to-back with a STAC meeting in Damascus from 14-16 July 2010, with participants representing all eight Project countries, including those not selected as priority countries for demonstration projects. Generalized tools for the collection of cost data alongside the demonstration activities were introduced by the international experts. Participants were taught skills in understanding economic analysis and cost-effectiveness analysis, costing methods for the use of resources, and measurement and analysis of effectiveness data in intervention trials. Participants also learned to develop tools for data collection for an economic evaluation and to define activities and inputs for interventions of long-lasting insecticidal nets and indoor residual spraying.

Several countries requested the support from the international experts to assist in on-site review of tools and methods. In 2010-11, the international expert on cost-effectiveness analysis made site visits to the Islamic Republic of Iran, Morocco, Sudan and the Syrian Arab Republic. The purpose of the visits was to adapt the generalized tools to each specific country context and to provide country teams with training on the use of these tools for data

collection. In adapting the tools, the comparability of data collection methods across countries was enhanced.

A standardized cost collection instrument was designed to capture all types of resource use and to quantify resource use for all activities related to the provision of long-lasting insecticidal nets (LLIN) and indoor residual spraying (IRS), adapted for use at several administrative levels. During country visits, key informant and stakeholder interviews were held, documents reviewed and field sites visited, and data collection tools were adapted to the local situation. Unfortunately, Yemen could not be visited by the international expert due to socio-political unrest. Technical assistance was provided for implementation of the demonstration projects in line with the agreed protocols.

2.1.5 Implementation: Islamic Republic of Iran

The Iranian team had initially planned to conduct two demonstration projects, one rural study to compare cost–effectiveness of LLINs plus larviciding with LLINs plus IRS plus larviciding, and one urban study to compare cost–effectiveness of methods of larval control in water reservoirs.

The rural study had been prioritized among the two studies, but was discontinued because of a sharp decline in malaria incidence to almost zero cases in the study area (Hormozgan Province) following intensive malaria elimination efforts. Clearly, a prerequisite for the cost-effectiveness study is that malaria is prevalent in the study area. At the time that the study was conceived, malaria prevalence was still considered sufficient to measure impact of the interventions on disease. However, the positive effects of malaria elimination efforts on the prevalence level and on the prospects for the study were apparently not foreseen at the onset. Possibilities to refocus the rural study towards high-risk migrant populations were discussed by the STAC but were not considered appropriate within the context of the Project.

Instead, the attention was redirected to the second study, in an urban setting. This study was carried out in an area on the outskirts of the city of Chabahar the southern district in the Sistan and Baluchistan province with relatively high prevalence of urban malaria transmitted predominantly by *Anopheles stephensi*. Preliminary surveys of the study area had identified domestic water reservoirs as potential breeding places for malaria vectors. Conventional vector control interventions were the use of chemical and/or biological larvicides. The use of lids to cover water reservoirs was known to be efficacious against vector breeding. Therefore, the country team decided on a study with the objective to compare the (cost-)effectiveness and acceptability of this intervention with the reference treatment in a programmatic setting.

In 2011, it was reported that the study area had been mapped and divided into blocks which would be randomly allocated to one the two interventions: use of lids to cover water reservoirs and the reference treatment of use of larvicides (*Bacillus thuringiensis israelensis*). The study area had 5000 houses and 2551 water reservoirs. It was planned that the map of the area would be used to form 40 blocks of approximately 120 houses each.

However, the STAC had noted that in this urban setting, the blocks were small, with little distance between the blocks, which made the study unsuitable for measuring impact on disease incidence, or even on densities of adult mosquitoes, due to the anticipated ‘contamination’ effects. Hence, it was not deemed possible to study effectiveness in terms of

malaria control. As primary outcome measure was therefore taken the larval density, and as secondary outcome the acceptability of the intervention.

This was unfortunate because demonstration of the effect on larval densities is not very different from an efficacy study, and the efficacy of the method of covering water reservoirs was already known. One disadvantage by focusing on larval densities, for example, is that it cannot be ruled out that important vector breeding sites are missed in the intervention. Nevertheless, larval density does provide an indication of impact of the interventions.

It is unclear how the study had been designed: was this done on the assumption of measuring impact on disease (in which case the contamination effect was overlooked) or was this done to measure impact on mosquito larvae or adults? If the study had been designed to measure impact on larval densities, the size of the study could probably have been scaled down.

By mid-2012, it was reported that baseline data on demographic, serological and entomological parameters had been collected. Also, considerable effort had been made to develop six types of water reservoir lids and compare their cost and effectiveness. A preliminary assessment was made of public acceptability of the different types of lids. The lid type that will eventually be selected is expected to be locally produced. What has been holding up the actual intervention is the cost of reinforced concrete covers. Low cost alternative covers have been explored.

Despite the problems in the design and implementation of the experiment, the study has generated substantial interest among local leaders and the community. The Project has held meetings with local stakeholders and the city's local governor has given his support. The high visibility and potential for community participation and sustainability are important aspects of this demonstration project that should not be under-estimated.

Several recommendations can be made to maximize the benefits of this interesting demonstration project during the remainder of the GEF Project. It is **recommended**, if it is not too late, that the demonstration project ascertains that its data collection methods and experimental methods are properly adjusted according to the revised outcome measures (i.e. larval density and community acceptability) as suggested by the STAC. This will help ensure that the resources stay focused and that realistic and solid results are obtained without further delay. In anticipation of the benefits of the new intervention, a plan should be in place for up-scaling or marketing of the intervention and dissemination of relevant information to local leaders and the general public, and that localities for replication of the intervention are identified.

Further it is **recommended** that the side effects (benefits, undesired effects) of the lids for water reservoirs are explored and documented. For example, do the lids prevent other pests or sources of pollution in the water containers? How do residents perceive these benefits? What is the effect of the covers on water temperature? Also, has the use of larvivorous fish in water reservoirs ever been attempted?

As a general comment, it is vital that the experience and results of this demonstration project are properly documented. Hence, it is **recommended** that an illustrated case study – describing the planning, implementation, evaluation and lessons learnt – is prepared for national and international use.

2.1.6 Implementation: Morocco

Morocco was certified malaria-free in 2010. However, in the past decade there has been an increase in the number of cases of cutaneous leishmaniasis transmitted by sandflies. In case of a leishmaniasis outbreak, it is possible that authorities will revert to indoor residual spraying using DDT, especially because evidence on the effectiveness of alternative methods has been lacking. Hence, the protocol of the demonstration project focused on the comparative effectiveness of alternative methods for leishmaniasis vector control. It was anticipated that the results would also be relevant to other north African countries where leishmaniasis is endemic.

The objective of the study was to compare the effectiveness of IRS using the pyrethroid alphacypermethrin, and LLIN in reducing incidence of leishmaniasis, when used in addition to environmental sanitation.

The international expert on intervention studies assisted in the finalization of the study's design and selection of localities in a mission in 2009 (Annex 8). The international expert on cost-effectiveness visited Morocco in 2011 and 2012, after initial data had been obtained. A cluster randomized controlled study was implemented in 43 localities distributed over eight provinces which were endemic for leishmaniasis, with a total of 27 277 people covered by the interventions (on average 634 people per locality) and an average incidence of 5 cases of leishmaniasis per 1000 population. Each locality was randomly allocated to one of three treatments: IRS with a pyrethroid in combination with environmental sanitation (14 localities); distribution of LLINs in combination with environmental sanitation (15 localities); and environmental sanitation alone (14 localities). Field staff were trained on the identification, surveillance and control of sandfly vectors. IEC Campaigns were conducted to sensitize communities and to improve their compliance with the introduced interventions. The intervention of environmental sanitation consisted of waste disposal and general hygiene.

Environmental sanitation was taken as reference treatment, because this represented the generally recommended practice at community level. This assumes that environmental sanitation was already in place and did not need strengthening at the start of the study. However, it was reported that in all localities, activities were conducted to increase public awareness about the need for improved environmental sanitation and hygiene. Hence, it is reasonable to assume that environmental sanitation practices at community level did improve during the implementation of the Project. As a result, the intervention of environmental sanitation in the three study arms may not accurately reflect the reference situation at baseline. The effect, if any, of the increase in environmental sanitation (relative to the baseline situation) should be accounted for.

The IRS intervention was implemented in the month of June during three consecutive years: 2010, 2011 and 2012. The IRS intervention covered 96% of houses and a population of approximately 10 000 people in the study areas. The LLIN intervention was implemented in 2010 by distributing nets in the selected localities. Because of a problem in the supply of LLINs, conventional insecticide-treated nets (ITNs) were used instead of LLIN in two-thirds of localities. Nevertheless, in 2011, more LLINs became available and all ITNs were replaced by LLINs. In total, 6400 nets were distributed, protecting an estimated 10 600 people, or 99% of the population in the study areas.

Data collection included active and passive case detection and entomological surveillance. Routine surveillance of sandfly densities was conducted in 2010 and 2011 using sticky traps and CDC light traps. Also, susceptibility of sandfly vectors to insecticides was tested at four locations, which confirmed susceptibility to alphacypermethrin, lambdacyhalothrin, DDT and malathion. The results of this study were published (*9*)[1]. A challenge faced in data collection is the available human resources for entomological surveillance in some provinces. The STAC raised certain technical issues such as the timing of IRS, the detection of cases by smear, and the influence of people's migration.

Preliminary results on the effectiveness of interventions are promising: One year after the interventions had been implemented, the incidence of leishmaniasis was 79% lower in the IRS treatment than in the control; this indicated a highly significant effect by IRS. In the LLIN treatment, incidence was 50% lower than in the control, but this result was not (yet) significant. Entomological impact data are still awaited.

Data related to the cost have been collected for two years. When comparing the cost per person protected for IRS and LLINs, the LLINs appeared to be less costly if properly used (US$ 6.56 and 7.91 per year for LLIN and IRS, respectively). However, data on community compliance with the interventions have not yet been reported: this is an important aspect of the study that requires special attention in the remaining Project period. After final results have been obtained, data on effectiveness and costs will be used to compare cost-effectiveness of each intervention. The international consultant on cost-effectiveness reported that it may be difficult to extrapolate the results on costs to other countries endemic for leishmaniasis due to local differences in community and health system structures (e.g. differences in delivery costs of interventions).

Summarizing, the demonstration project in Morocco has performed very well to date, with good routine epidemiological surveillance and impressive coverage of human populations, having already generated some promising preliminary results. However, a few comments should be made. (i) It is **recommended** that a clear assessment and presentation of the reference treatment (environmental sanitation) and its possible changes during the project is made; (ii) it would be interesting to present differences in the costs of delivery of interventions between provinces, if any; (iii) it is **recommended** that additional cost-effectiveness estimates could be obtained on the hypothetical use of DDT in IRS, on the assumption that the effectiveness is the same as for pyrethroids; (iv) it is **recommended** that results on people's perceptions and compliance with the introduced interventions are given due attention in the presentation of final results.

2.1.7 Implementation: Sudan

In Sudan, resistance of malaria vectors against DDT, pyrethroids and organophosphates has been reported. Where vectors are still susceptible to DDT, authorities could decide to revert to using DDT. The team initially proposed four studies but selected one study as demonstration project. IRS and LLIN were considered to be the alternative interventions of choice in the control of malaria and leishmaniasis but their relative cost-effectiveness in

[1] Outputs published as: Faraj C et al. Insecticide susceptibility status of *Phlebotomus (Paraphlebotomus) sergenti* and *Phlebotomus (Phlebotomus) papatasi* in endemic foci of cutaneous leishmaniasis in Morocco. Parasites and Vectors. 2012; 5(1):1–6.

situations with and without insecticide resistance was not known. The STAC pointed to the importance of environmental management, with a long history of use in the Gezira irrigation scheme, but for unknown reasons this component was not incorporated in the study's design.

The primary objective of the demonstration project in Sudan was to assess the cost-effectiveness of the combined use of LLINs and IRS with the use of LLINs alone and with the use of IRS alone. The secondary objective was to study whether insecticide resistance has an impact on the effectiveness of vector control interventions. It soon became apparent that allocated project funds were inadequate. Fortunately, the opportunity presented itself for collaboration with a project on monitoring and management of insecticide resistance supported by Bill and Melinda Gates Foundation (BMGF), thus making use of increased co-financing.

The international experts made several missions to Sudan to advise on the design, training, implementation and analysis of the study. A cluster randomized-controlled trial was designed with three treatment arms: LLIN, IRS and a combination of LLIN and IRS. However, after the baseline data showed relatively high ownership of insecticide-treated bed nets, the design was changed to the comparison of LLIN+IRS and LLIN only. The study was conducted in four areas, each with a different situation of known insecticide resistance: El Hoosh with pyrethroid + DDT resistance; Hag Abdalla with pyrethroid resistance; Galabat with no resistance; and New Halfa with DDT + organophosphate resistance. In accordance with the local resistance situation, the choice of insecticide for use in IRS was: pyrethroids in Galabat and bendiocarb in the remaining three areas.

Within the four study areas, 140 study clusters of approximately 2500 inhabitants each were identified and mapped. Clusters were assigned to each of the two treatments. This was done through a process of so-called restricted randomization to ensure that important variables were equally represented in each study arm. These variables were: genotypic insecticide resistance frequencies, baseline ITN coverage, presence of home management of malaria, and cluster population size. Enumeration and population census was conducted in each cluster. The IRS campaign was implemented twice a year in 70 clusters. The larger clusters were sub-divided into blocks.

Substantial investment has been made in capacity-building in support of the study. 143 community health workers were recruited (one per cluster) and were trained to carry out active case detection and assessment of intervention coverage. Health facility patient registration was strengthened, and home-based malaria management was established in those clusters without health facilities. Forty-two entomological assistants were recruited and was training given, with technical support from the Liverpool School of Tropical Medicine. Training materials and operating procedures were prepared for community health workers, entomological assistants and site coordinators. Two field insectaries were established and an existing entomological laboratory upgraded with new equipment for molecular analysis.

Data were collected on epidemiological, entomological, operations and socio-behavioural aspects. The baseline survey of epidemiological (malaria indicator survey of 2860 households) was conducted in October 2010, under supervision of the expert from the London School of Hygiene and Tropical Medicine (LSHTM). Results showed 47% of households owned at least one ITN, but poor bednet use and a 4.2% malaria prevalence in children under 10.

A major strength in the design of the study was that a system was established for reporting on cohorts of children (6 months to 10 years). In each of the 140 clusters, a cohort of 200 children was recruited through informed consent (28 000 children in total). Community health workers were trained to visit each cohort household to record fevers at weekly intervals during the malaria season and every 2 weeks outside the malaria season. In case of observed or reported fever, a rapid diagnostic test and/or microscopy check was to be conducted to verify presence of malaria parasites.

Unfortunately, the cohort case reporting faced some unexpected barriers in its first year. The cohort study was delayed until after the interventions had already been implemented. Once case reporting was started, it initially yielded unreliable data because community health workers had included unconfirmed cases (e.g. based on clinical signs only) into their records. These setbacks may have weakened the potential results that can be achieved by the end of the study. The research team has proposed some mitigating strategies: to conduct prevalence surveys strictly during the peak of the transmission season each year, and to improve documentation at field level to avoid that unconfirmed cases are included in the database. Also, the STAC has recommended cross-sectional surveys using serological techniques to monitor malaria prevalence to complement the system of case incidence reporting.

A mission by the expert from LSHTM to Sudan in October 2012 was made to provide further technical support to the cohort study and cross-sectional study on malaria incidence and prevalence. The expert reported that an improved system of cohort case recording and data management had been introduced and was functioning well: The cases recorded by community health workers accurately reflected malaria infections. Preliminary analysis of the results obtained in 2012 suggested that malaria incidence was 35 cases per 1000 population per year. To safeguard further data collection, a system for routine supervision and monitoring of the activities of community health workers was proposed by the expert. The expert also prepared a work plan for the serological survey, requiring an additional estimated US$ 15 000. The study protocol was registered and submitted to the clinical trials data base.

Besides malaria, the study is also looking at visceral leishmaniasis. The effect on leishmaniasis was studied in one of the study areas where this disease is prevalent. Incidence rate is measured through passive case detection. A non-random control arm was established for the purpose of comparison with the situation without the project's interventions.

Regarding entomological surveillance of malaria vectors, a selection of the clusters served as sentinel sites for monitoring of insecticide susceptibility and other entomological parameters for malaria vectors. It has not been reported whether insecticide susceptibility testing has been carried out for sandfly vectors. The WHO bioassay on insecticide susceptibility was conducted with mosquito samples from 49 clusters. Preliminary results indicated widespread resistance to deltamethrin and DDT, but not to bendiocarb. In 2012, pyrethroid resistance was reported from all four project areas, DDT resistance from two and organophosphate resistance from one area. The component of monitoring and analysis of insecticide resistance has been financially supported by BMGF.

Major procurements were needed to cover the targeted populations. This included drugs and rapid diagnostic test kits, 208 887 LLINs, and 15 tonnes of insecticides (pyrethroids and carbamates). All costs involved in the IRS campaigns were contributed by the Government of Sudan.

The two interventions, LLIN and IRS were successfully rolled out in the designated clusters. By April 2011, all clusters were reported to have received universal coverage with LLINs (1 per 2 persons). In the clusters allocated to IRS, 57 clusters received two rounds of bendiocarb and 13 clusters received two rounds of deltamethrin in 2011, depending on the local resistance situation. A household survey held in October 2011 confirmed high coverage of targeted populations with the treatments IRS and LLIN. Average LLIN ownership was 3 nets per household, with only 6% of nets showing any damage. Cone bioassays carried out 3 months after IRS operations showed moderate mortality levels of mosquitoes exposed on brick and cement walls but poor mortality levels on mud, thatch or grass walls.

Paper sheets containing instructions on the use and benefits of nets have been distributed to communities together with the nets. The project had conducted IEC campaigns for each intervention, but this activity has not yet been documented.

In summary, the performance of the study in Sudan appears to be on track. This achievement is commendable in view of the scale and scope of the study, in terms of geographic coverage, multiple stakeholders involved at all levels, array and complexity of data collected, and operational and technical barriers encountered. The study demonstrated that it is possible to implement a major research trial within a GEF-demonstration project in an operational context. This experience will serve as incremental benefit to other DSSA projects. The study is expected to yield a wealth of information on the effectiveness of interventions, effect of resistance on vector control, and on related issues such as: bed net use, bed net durability, mosquito biting behaviour, development of insecticide resistance, and determinants of malaria prevalence. It is expected that this information will benefit future decision-making on vector control, with replication value in other countries. The Project's international experts have been instrumental in the design, training and coordination of the study. The study has been possible because of good collaboration and complementary support from the Government of Sudan and from the BMGF project implemented by Liverpool School of Tropical Medicine.

A critical note about the design of this study is the focus on insecticidal methods only – amidst a situation where multiple resistance mechanisms are already prevalent in vector populations. The study did not incorporate non-chemical methods or preventive strategies of vector control into its design (e.g. LLIN plus environmental management as third study arm) to reduce sole reliance on insecticides, despite the recommendation made in an earlier STAC meeting. This missed opportunity raises questions about the review and approval procedure of the study's proposal – a matter that should be addressed in the final evaluation.

Based on the documented information, it is **recommended** that during the remainder of the Project period, the study in Sudan continues to prioritize the quality of data collection related to effectiveness, through routine M&E with timely missions of consultants, if needed, to advice on corrective measures. This will help safeguard the investments made in the study so far. If necessary, extension of the study should be considered in time so that additional resources can be secured.

The study has its own mechanism of M&E in place at several levels of implementation, under supervision of the international experts. Therefore, no specific recommendations are needed in the technical realm of the study. However, in view of future efforts to promote environmental management, it is **recommended** that the study team describes larval breeding

locations (including dry-season refugia), characterize habitats and determine pupal productivity. Moreover, the documented evidence so far suggests a weakness in the socio-behavioural aspects of the study that need to be addressed or clarified: It is unclear whether IEC or COMBI campaigns have actually been implemented and, if not, whether they are being planned; how the interventions are perceived by the community, and how the project has changed people's behaviour with respect to treatment seeking, self-protection or vector control.

2.1.8 Implementation: Syrian Arab Republic

The Syrian Arab Republic was one of the five countries initially earmarked for demonstration projects. The demonstration study had made a promising start but unfortunately had to be abandoned later on due to the national security situation. The country team prepared a plan to compare the cost-effectiveness of IRS (the reference treatment) and LLINs in controlling cutaneous leishmaniasis transmission. The study was designed as a cluster randomized controlled trials with two study arms: IRS alone versus LLIN alone. 60 villages or suburban units were selected from two districts in Aleppo and Hama governorates were randomly allocated to each study arm. In 2010, the team reported progress in the preparation of questionnaires, recruitment of field workers, training of field staff, and mapping and enumeration of houses. The two interventions, IRS and LLIN, had been rolled out in the designated villages. LLINs were distributed in June 2010 followed by health education campaigns.

It was reported that environmental sanitation was promoted through meetings with local authorities and health education of communities. Apparently, this was an additional intervention that was implemented in both study arms. This would introduce a temporal confounding variable into the study similar to that of the Moroccan study. Epidemiological surveillance was conducted through passive detection of new cases every three months. Entomological surveillance was carried out with sticky traps to monitor adult sandflies every two weeks in sentinel sites and identification of sandfly species. These were promising developments.

The start of the study suffered from a delay in the request and receipt of Project funds. As a result, the selected insecticides were not available in time and the IRS intervention was implemented with products of questionable quality. This matter caused the STAC to question whether the Syrian study should be continued. The STAC felt that the Government was insufficiently committed to invest in capacity-building for vector control, including vector surveillance, vector control interventions and pesticide management.

In 2011, preliminary results indicated a sharp decline in leishmaniasis cases from one year earlier in the LLIN and IRS study arms but not in the control areas outside of the study. Despite these positive results, the STAC was concerned about the quality of the IRS intervention and about the actual data analysis, and recommended that the country team should receive increased support for data collection, analysis and M&E.

In 2012, it was clear that the security situation had impeded surveillance activities. The STAC decided that the Syrian demonstration project should be discontinued but that this decision would be reviewed as conditions improve. Project funds that were earmarked for the

demonstration activity in the Syrian Arab Republic were to be re-allocated in other Project activities.

From the available information, it appears that it may be difficult to justify continuation of the study once the security situation in the Syrian Arab Republic improves. The earlier concerns by the STAC about the quality of the first results suggest that the baseline against which future observations would be measured may not be reliable. Hence, it is **recommended** to re-allocate the earmarked funds to other Project activities. It should be noted, however, that the preparatory work in advance of the study and investment made in initiation of the study addressing a major public health problem deserves a second chance, for example in the form of a dedicated follow-on project. It is **recommended** that in the remainder of this Project, the Syrian team receives support in project formulation and application for new sources of funding in anticipation of re-starting the intended study in the coming years.

2.1.9 Implementation: Yemen

The Yemen team presented their plan for the demonstration project only in 2010, when demonstration projects in other countries were already on-going. The team aimed to compare cost-effectiveness of LLIN, IRS and LLIN+IRS in three altitude-based epidemiological strata. The proposed plan was to assign the treatments as per national strategic plan for malaria elimination, which is: two rounds of IRS below 600 m altitude; LLINs plus one round of IRS at 600–1000 m; and LLIN above 1000 m. Nevertheless, the STAC considered this plan unsuitable for the systematic comparison of interventions.

Then, in 2011, the Yemen team presented a revised plan for a randomized trial with only two study arms (LLIN; LLIN+IRS) in only one zone (at 600-1000 m altitude) where no malaria control interventions had previously been introduced. The STAC recommended an expansion of the study from the proposed 18 clusters (i.e. at least 40 houses) to 40 clusters, with 2 km distance between clusters. The detailed study protocol for census, baseline survey, epidemiological and entomological surveillance remained to be finalized. Despite the major delay in the start of the demonstration project, the Yemen team would take advantage of progress made in Sudan through exchange of information, methods and tools. Unfortunately, however, the exchange of expertise through country visits from Sudan to Yemen was obstructed by the security situation in Yemen.

A visit by the international expert on cost-effectiveness to Yemen was planned but had to be cancelled due to the political turmoil. Fortunately, the consultant on intervention studies was still able to provide technical assistance in the design and planning for the study.

In 2012, the Yemen team reported that 12 clusters had been selected in a valley with a perennial stream (total population of the valley: 29 000). A baseline malaria survey had been carried out at peak transmission in October 2011. Average prevalence was 20%, but showed large variations between clusters (0-56%). Based on the range in prevalence data, three strata (low, medium and high prevalence) were identified, and within each stratum, clusters were randomly allocated to each of the two study arms. Entomological surveys were conducted in April and June 2012, for identification of species, testing of insecticide susceptibility, testing of blood meals and malaria sporozoite rates. Health staff was trained on passive surveillance and data recording. It was reported that the distribution of LLINs had started and that the IRS

intervention was planned for September 2012. Villages in between clusters would also be covered by LLINs. Malaria diagnosis will be by rapid diagnostic tests and microscopy. The study received ethics approval from the National Committee for Health Research.

Challenges in its implementation are: restrictions in travel due to socio-political unrest and poor accessibility of the study area; a major increase in operational costs (mainly due to increased petrol prices); community awareness and compliance with interventions; and inadequate entomological capacity. The STAC recommended in 2012 that Yemen should receive US$ 200 000 for continuation of the demonstration project which has now got off to a good start.

Summarizing, the study in Yemen started late with the interventions being rolled out only in 2012. The size of the study is relatively small and its design straightforward. Considering the local prevalence of malaria and the absence of previous vector control interventions, the study may be able to show substantial reductions in prevalence and incidence in the two treatment arms within the remaining project period, even from the data on passive case detection.

Based on the available information, it is **recommended** that in the remaining Project period the study is continued with increased attention being paid to training, surveillance, monitoring and evaluation, and with IEC campaigns to educate communities about the need to comply with the interventions. The continued involvement of the international experts and exchange of expertise with Sudan, if possible through missions, will be instrumental to safeguard the quality of data on effectiveness. Studies on the diurnal biting and resting behaviour of *Anopheles arabiensis* should also be considered.

2.1.10 Monitoring and evaluation

Implementation of the demonstration projects in each country need careful monitoring and evaluation in accordance with the action plan and timelines set in the protocols in order to take corrective action or to re-allocate budget allocations were required. Mechanisms for monitoring, evaluation and surveillance at country level have been discussed in the previous sections (2.2.5–2.2.9).

The STAC emphasized the value of the regional approach in the demonstration projects. This approach could make efficient use of shared resources, information exchange and use of standard methods and tools, which also applies to monitoring and evaluation activities. The harmonization of protocols and standardization of methods, tools and indicators have facilitated M&E activities across countries. Preliminary data on impact indicators are available from several countries, as reported in previous sections.

At regional level, M&E of project activities is conducted by the STAC, through information provided in annual country progress reports, by presentations of country representatives at annual meetings, and by visits to demonstration projects by STAC members (Annex 8). STAC members (i.e. international experts and WHO Regional Office staff) have made a number of visits to monitor and evaluate the progress on demonstration projects in countries (see section 2.5.2). These visits were made to the Islamic Republic of Iran, Morocco, Sudan and Syrian Arab Republic at the initiation of demonstration studies. Monitoring and evaluation of the demonstration projects in the Syrian Arab Republic and Yemen was

hindered by the security situation from 2011. One visit was made to Yemen in January 2011 to assist in the design of the study, but no follow-up visits could be made to Yemen, which is a significant shortcoming in monitoring the activities that have now started in that country.

Reciprocal visits to demonstration projects can be very useful and motivating for sharing experiences between countries. A field visit to the demonstration project in Morocco has been included in the fourth STAC meeting in July 2011. A field visit by meeting participants to the demonstration project in Sudan during a future STAC meeting would be recommended. The annual STAC meetings provided a forum for evaluation of progress and results and for recommendations on corrective actions. The STAC has produced and disseminated its annual reports which included its recommendations.

2.1.11 Analysis of data

The data on costs and impact indicators collected by country teams should be properly analysed, with technical assistance by the international experts. Some preliminary data have already been presented by the experts, but the main part of the analysis is still pending. Tools for cost-effectiveness analysis and methods on the measurement and analysis of effectiveness data in intervention trials have been developed by the international consultants and have been adapted to each country's situation, for use by trained country teams (see section 2.1.4).

Based on the complexity of data analysis on effectiveness and cost-effectiveness, the STAC had agreed that international experts should play a leading role in the analysis. Hence, only part of the analysis will be done by country teams, whereas the final results will be compiled and analysed by the international experts. This option was deemed more appropriate and feasible within the Project's framework than the alternative option of building capacity in countries to conduct the full analysis and documentation independently. This decision, however, has implications for stakeholder involvement and project ownership (see section 6).

The presentation and interpretation of results should be in an appropriate form, accessible and suitable for decision-makers, policy makers and programme managers. In parallel, the results should also be prepared for publication in scientific journals subject to independent peer review.

2.1.12 Consolidation of results

Towards the end of the Project, a STAC meeting should be organized to review the results of demonstration projects in individual countries and consolidate the results into a synthesis report with overall analysis and descriptions of lessons learnt at regional level. This activity is forthcoming.

2.1.13 Summary and recommendations, Component 1

The demonstration projects have made important progress to date, with well-designed studies, successful rolling-out of interventions and sound systems of epidemiological and entomological surveillance in place in several countries. The individual studies have shown a large variation in their implementation, with the abandoned project in the Syrian Arab Republic at one end of the spectrum and the impressive research effort in Sudan at the other. It is expected that the studies will make an important contribution to the evidence base on

alternatives to DDT, showing the effect of alternatives on disease prevalence and/or entomological parameters. This evidence, which has been largely lacking prior to implementation of the Project, will provide countries with a better basis for decision-making on alternative products and methods of vector control, thus reducing the tendency to revert to use of DDT. An inevitable limitation of the studies is that direct comparisons with DDT could not be made on cost-effectiveness due to the zero-use of DDT at baseline in all Project countries.

The actual number of demonstration projects mentioned in the Project's logical framework was 16 studies. Following the assessment of the situations in each country, however, the STAC reduced this target from 16 to 5 studies, each representing a medium to large-scale randomized controlled trial. The reduction of the number of studies had several reasons. Three countries were not earmarked for initiating demonstration projects because of insufficient available capacity. In the remaining five countries, only one demonstration study was implemented per country, largely because of the size of the studies and because of available resources. The project in the Syrian Arab Republic was discontinued due to the security situation. The study in Sudan is by far the largest, which is justified by the disproportional high disease burden and major problems with insecticide resistance experienced by this country. Overall, the performance of Component 1 is satisfactory.

2.2 Component 2: Capacity built in each country to plan, implement and evaluate the application of alternatives based on the principles of IVM

2.2.1 Background

The Project Document recognized that the demonstration of cost-effective alternatives of vector control (Component 1) will not be sufficient to ensure a transition away from DDT, but that the alternatives should be embedded within a more broad-based management approach that aims at optimizing the available resources for vector control. This approach, along the principles of IVM, should involve the health system and other sectors, and should have active participation of communities to make sure that opportunities for the prevention and control of vector-borne diseases are utilized. Implementation of IVM requires adaptive mechanisms of surveillance, analysis and decision-making to adjust operations to diverse and changing settings and to prevent that insecticide resistance gene frequencies increase within vector populations.

The transition towards an IVM approach requires comprehensive capacity-building in terms of increased knowledge and skills, a supportive legal framework, re-structuring of programmes, and strengthening of institutional arrangements. The VCNA analysis conducted by Project countries during the PDF-B highlighted the urgent need of countries to strengthen their capacity for IVM and pesticide management. The fact that capacity and logistical constraints prevented some countries from having demonstration projects (see 2.1) signifies the gaps that still exist. The STAC agreed that pesticide management is highly relevant to the IVM approach because pesticide management aims to reduce the risks of human and environmental exposure and helps avoid the re-accumulation of obsolete pesticide stocks. To put it another way: with the current reliance on pesticides for vector control, the improved

management of those pesticides will be an immediate contribution towards IVM. Therefore, capacity-building to improve pesticide management for vector control was incorporated in the activities under Component 2.

2.2.2 Policy and regulatory control

The STAC in its first meeting reiterated that IVM strategies can only flourish in an enabling policy environment and with supportive regulatory control. The policy environment, however, was an area identified in the VCNA as a weakness in all Project countries. To confront this situation, the STAC proposed that high-level meetings be held at national level in each Project country to review the legal framework in order to gain support for IVM and pesticide management. Subsequently, national strategies and action plans should be prepared, with the help of consultants, for the implementation of IVM and sound pesticide management. Those national action plans should be reviewed at multi-stakeholder meetings in order to gain broad-based support. Also, technical support should be given for implementation of the action plans.

The Project's progress report in 2011 indicated that all these activities had been for 100% completed in Project countries by December 2009. Reportedly, this was conducted with co-funding support. Documentation about these achievements and the scale of funding, however, is largely lacking. Only some details have been provided by Project countries which is presented here. The WHO should urge countries to complete this information before the next STAC meeting.

In Djibouti, a complete turnover of Ministry of Health staff delayed progress on IVM. In a workshop held in 2011, ministry officials and development partners were educated on vector control and the need for human resource development for malaria elimination. In 2012, the Project provided technical support to assist the country in the development of its national plan of action on vector control. The IVM steering committee, which had been established, highlighted the need for capacity strengthening within the Ministry of Health to manage the Project's activities.

In Egypt, a workshop was held in April 2012 with co-financing for the national policy-makers and technical staff representing Ministries of Agriculture, Health and population, Irrigation, Local Development (Municipalities) with assistance from WHO to create awareness on IVM and to revive the IVM steering committee. The mission and function of the steering committee and implementation of the plan of action were discussed. Also, IVM workshops were held in two governorates to assist in planning vector control programmes.

In the Islamic Republic of Iran, a multisectoral national IVM steering committee has been established, but information on its meetings and outcomes is lacking.

In Jordan, a large, high-level national meeting was held in March 2012 to raise awareness and support for IVM and pesticide management policy and regulations. The meeting was attended by decision-makers from the Ministries of Health, Agriculture and Education, with the participation of 60 stakeholders from sectors involved in vector control activities in the country. A national IVM committee was formed (or, revived) and regular meetings were conducted in May and June, 2012. A national plan on IVM and regulatory control of pesticides was developed, and existing regulations on pesticide management were revised.

Details on implementation of the national plan, and the technical support received, have not been provided.

Morocco completed the review of its legal framework and development of its national IVM strategy at an early stage, although support for implementation was still lacking. It has implemented IVM committee meetings at national and local level, with government funding. The national IVM committee conducted a situation analysis and developed a national action plan on sound management of public health pesticides in the context of the Bill & Melinda Gates project #45312.

In Sudan, the intersectoral committee on vector control advocated the principles and promoted the implementation of IVM and helped strengthening the collaboration between sectors. A national strategic plan for IVM was formulated, and IVM principles were incorporated in national health policy.

In the Syrian Arab Republic, an IVM intersectoral committee was formed in 2008, but the STAC noted that political commitment to invest in capacity strengthening of vector surveillance and vector control and an inappropriate institutional framework was weak. Government funding was provided for IVM committee meetings. Pesticide management legislations and policies were in place but were reportedly not fully being implemented and monitored.

In Yemen, a national IVM policy was formulated in 2006; the National Malaria Control Programme (NMCP) was restructured in 2008 with a separate department on IVM; and a technical committee on intersectoral collaboration was established in 2008. The government has provided funds for seminars and workshops for directors and staff in districts.

Hence, it appears that national IVM committees are in place in the Project countries. These committees had to be revived in Djibouti and Egypt, with technical support provided by WHO. The IVM committees have been instrumental in reviewing the legal framework for IVM which, according to the progress report, has been completed in all Project countries. Unfortunately, details from individual countries have not been documented. The WHO should urge countries to complete this information before the next STAC meeting.

In addition to the achievements in Project countries, an important spin-off at regional level is that the Project's activities and consultations have contributed to the development of a regional resolution on managing the use of public health pesticides, which was adopted by the WHO Regional Committee for the Eastern Mediterranean in October 2011 (*10*). This resolution led to the framework for action on the sound management of public health pesticides (*11*).

2.2.3 Advocacy on IVM[2]

The establishment of intersectoral collaboration and community participation have been identified as major obstacles in implementation of IVM. To raise awareness about IVM and the risks of pesticides, the STAC recommended several activities: the preparation of advocacy materials on IVM by WHO, including translation of existing documents on IVM

[2] The indicators for outcome 2.2.1 and 2.2.2 in the Project's log frame need to be revised because they do not refer to the outcomes of institutional arrangements and the use of existing structures.

and pesticide safety; intersectoral workshops to advocate IVM; and communication and education of the general public. Institutional arrangements between sectors and within the health sector would be strengthened through national seminars. It was also suggested that existing local health services, agricultural extension services and farmer field schools are used to channel messages on IVM to rural communities.

The development of promotional materials was reported to be on track. The WHO has assisted in the production of posters and brochures in several key languages for the Region. Also, countries have reportedly been assisted to adapt the advocacy materials to their own context and needs. Moreover, the progress report indicated that seminars to enhance collaboration between sectors have been conducted in all Project countries. For example, in Jordan, a high-level national meeting was conducted in March 2012 to raise awareness among decision-makers and participants from different sectors and to gain support for IVM and pesticide management. In Morocco, the Ministry of the Interior facilitated the regular meetings of provincial committees consisting of multisectoral stakeholders. In Sudan, seminars and radio broadcasts on IVM advocacy have been conducted. Likewise, the Syrian Arab Republic and Yemen reported government funding for advocacy workshops and media coverage. In Djibouti no major advocacy on IVM has been conducted.

The development of documented case studies on the restructuring of institutional arrangements between sectors or within the health sector has not yet been achieved in Project countries.

2.2.4 Vector control units

Most countries have more than one disease-specific vector control programme in place. Coordination between these programmes is important for the harmonization of efforts, which helps maximize cost-effectiveness, avoid duplication and reduce wastage of resources. To this aim, establishing a central vector control unit at national level can be instrumental for the implementation of an IVM strategy.

The STAC proposed that WHO promote the concept of vector control units in Project countries by writing to the ministries of health. The actual restructuring, if applicable, should then be initiated by the national IVM steering committee, which should include the preparation of a mission statement, terms of reference, or measures to strengthen existing vector control units. The STAC also proposed that WHO produce a concept paper on the experiences with restructuring of vector control arrangements.

The Project's progress report in 2012 indicated that WHO has written about this subject to all Project countries, and 7 out of 8 Project countries have already achieved full restructuring of the vector control unit, with technical support from WHO and the STAC. Mission statements and terms of reference for vector control units, however, have been developed in only part of the countries. In some countries, a new unit has been created, in other countries a focal person provides coordination between disease-specific programmes. Morocco, for instance, has a separate department for vector control for its own budget, which liaises with departments for disease control. Sudan established IVM units at national and state level, with clear terms of reference, and mandate to coordinate vector control between the vector-borne disease departments and to implement vector control according to the national strategic plan for IVM. In 2008, Yemen established a vector control department from within the NMCP

with a mandate that covers dengue and chikungunya. In the Islamic Republic of Iran, vector control is still concentrated in the malaria control programme. Djibouti is still struggling to establish a vector control unit; terms of reference have been developed, but technical capacity remains poor.

WHO has prepared and published a concept paper about the restructuring of vector control units and other aspects of IVM, presenting initial experiences from Project countries (*12*). However, details on its implementation have been provided for only some Project countries. Also, more detailed information will be needed on the functionality of vector control units; e.g. whether the unit has been mandated and empowered to make any changes to existing vector control programmes, and to what extent the vector control unit has achieved the harmonization of vector control operations targeting more than one disease.

2.2.5 Guidelines and training[3]

A major requirement for effective implementation of an IVM strategy is that specific guidelines and training are provided to policy makers, programme managers, vector control staff, and community representatives[4]. The STAC identified three main activities with regard to guidelines and training: IVM guidelines and training materials adapted to the conditions of the Region should be developed; relevant case studies on implementation of IVM should be developed; and workshops and training-of-trainers courses on IVM for vector control professionals should be organized at regional level and at local level. Regional-level capacity-building activities were considered to be important, because of the generic character of the training curriculum of IVM, aiming to assist countries in developing their basic skills for adaptive management according to local circumstances.

The progress report indicates some progress in developing guidelines and training materials by WHO. Guideline documents on IVM, pesticide management and testing of insecticide resistance have been developed by WHO headquarters. These guidelines were reviewed by the Regional Office and have been disseminated to Project countries. Morocco has developed its own IVM manual, with sections on implementation and vector control tools. It is unclear whether the global guidance documents still need translation or adaptation according to the needs of other countries.

The progress report suggests that training courses on IVM at regional and local levels have not yet been conducted, indicating that it is an outstanding activity. Nevertheless, it is noted that a number of achievements have actually been made in training at several levels:

Egypt reported 47 local training workshops for over 900 vector control staff on the identification, entomological surveillance and control of leishmaniasis vectors and, in addition, three advanced training courses on vector surveillance for 71 staff from sentinel sites. In Djibouti, training of 22 staff was conducted on entomological surveillance for dengue and malaria. In Sudan, training courses on IVM have been conducted annually, training around 300 public health officers in total; moreover, workshops have been carried out on pesticide management. Sudan has over 104 MSc graduates in medical entomology and vector control,

[3] Outcome nr. 2.4 and its outcome indicator presented in the Project's logframe need to be revised because the intervention should not be restricted to training materials only but also include training courses.

[4] Specific training on demonstration activities and pesticide disposal is covered under Components 1 and 3, respectively.

who are operating in their states, 59 public health officers trained in vector surveillance, and 33 public health officers trained in vectors identification. In Jordan, a national training course on vector susceptibility to pesticides and IVM principles was conducted with technical assistance from WHO in October 2011. In the Islamic Republic of Iran, refresher courses were conducted in 2008 to strengthen national, provincial and district capacity among the vector control focal points.

Morocco reported on the training of 35 trainers in pesticide management; training on sandfly surveillance and control; training on IRS operations and LLIN distribution, and a workshop on community mobilization. Project activities in the Syrian Arab Republic Arab Republic have been discontinued due to the security situation, but the STAC recommended that the country will continue to receive support to participate in training and capacity development initiatives in the Region. Yemen reported on substantial government funding for training of staff, and training activities for technicians on vector surveillance entomological techniques and resistance monitoring.

The Project has supported the curriculum development for the WHO regional MSc-course in medical entomology and vector control at the University of Gezira, Sudan. Furthermore, the Project has sponsored the enrolment of candidates from Djibouti, Jordan, Sudan and Yemen. The curriculum of this course was subsequently adapted for use in other countries, including Afghanistan, Egypt, Islamic Republic of Iran, Pakistan, Palestine, and South Sudan, for additional training courses conducted with co-funding support. This has been an important spill-over effect of the Project, with substantial contribution to human resource development in the Region on entomological surveillance and vector control decision-making.

As a follow-up of the regional MSc course, it is **recommended** that the (spill-over) effects of the investment, in terms of adaptation and use of curriculum in other countries, current position and role of trainees, entomological surveillance and decision-making, are studied and documented.

It is further **recommended** that, if possible, the Project continues to support candidates from other Project countries in response to the severe shortage of public health entomologists and vector control specialists in the Region.

Regarding the development of case studies on IVM, this activity still remains to be carried out by WHO/EMRO. It is **recommended** that this activity is given due attention in view of its value for use in Component 4.

2.2.6 Summary and recommendations, Component 2

The demonstration of cost-effective alternatives to DDT for vector control should not be a stand-alone activity but be part of a more broad-based management approach that aims to optimize available resources for vector control. This approach should be supported by policy and institutional arrangements and facilitated by adequate capacity-building activities at all levels. Hence, it is essential that the Project invests in the strengthening of the capacity of countries for implementation of IVM in the broad sense. Indeed, without capacity strengthening on IVM, it is likely that the positive results of demonstration projects on cost-effectiveness will not be effectively adopted, adjusted, implemented and evaluated by countries.

The Project's progress reports noted significant advances in the development of policy and regulatory control, institutional arrangements and advocacy on IVM and/or pesticide management, but a lack of progress was reported in relation to training. The progress at the policy and institutional level is a promising result because it signals the commitment of governments to the concepts of IVM and/or pesticide management. Nevertheless, there are some concerns that need to be addressed by the Project in the years ahead. It is worth noting that in implementation of Component 2, WHO has not received the external technical support to the extent as in Components 1 and 3.

The main concern is that detailed documentation on achievements under Component 2 is mostly lacking. As a consequence, it remains difficult to estimate the actual capacity for IVM implementation that has been developed since the baseline. The pre-determined indicators alone are not sufficient but need to be supplemented with more descriptive narrative related to the functioning of the newly established policies, structures or capacities. For example, a national IVM policy may be in place, but it is also important to determine precisely how comprehensive this policy is, whether there is commitment from sectors other than health, and whether there are provisions for the implementation of policy. Likewise, a vector control unit may have been established, but it is also important to know whether the unit has been mandated and empowered to harmonize the activities of existing vector control programmes. It is **recommended** that descriptive details of achievements under Component 2 are obtained in the second half of the Project, if possible, with guidance provided by WHO. These details could also be used for the development of case studies.

In addition, it is **recommended** that countries revisit their comprehensive situation analysis at baseline (the VCNA) and determine how their achievements under Component 2 have addressed the gaps identified in the VCNA or, which shortcomings have not been adequately addressed. For example, it is important to evaluate the training efforts vis-à-vis the training needs identified in the VCNA of individual countries. This assessment will assist in the Final Evaluation of the Project.

Based on the Project's progress reports, it is **recommended** that the subject of training and human resources development on IVM is given increased focus of efforts in the remaining years. Most of the Project's training activities so far have been for the specific purpose of the demonstration studies (Component 1) or the disposal of pesticides (Component 3). However, further training on the management aspects of vector control in the broad sense is needed. The core structure for curriculum development on IVM is recommended for use (*13*).

2.3 Component 3: Collection, repackaging and disposal of POP pesticides used in public health and agriculture completed

2.3.1 Background

The need to address the problem of obsolete POP pesticides in project countries was identified in the results of the VCNA in the PDF-B. Clearly, solutions to the problem are: capacity-building for safeguarding and disposal and preventive measures for avoiding future accumulation of obsolete pesticides.

The Project Document foresaw from the start that the Project would be complementary to the FAO-led Africa Stockpiles Programme (ASP) which aims to collect and dispose obsolete pesticides (including POP pesticides) from priority countries on the African continent, including some countries in the reviewed Project. Hence, it was planned in the Project Document that Component 3 would only cover those Project countries which would not be covered under the ASP.

The Project Document identified the following activities necessary for a comprehensive disposal of POP pesticides: "Stakeholder analysis to determine which organizations should be informed and involved [...]; Training of personnel in safe and effective execution of updating the existing inventory of obsolete pesticides; Up-date the field inventories concerning public health pesticides and other POP pesticides stocks; Compile and analyse data collected during the up-date of the field inventory data; Procure equipment and services required to safeguard obsolete pesticides; Carry out repackaging and centralization of obsolete stocks prioritized for action under expert supervision; Securely store repackaged obsolete pesticides until further action for their elimination can be taken. These will then be exported for final incineration in a dedicated hazardous waste incineration facility abroad."

In their review of the Project Document, the GEF-SEC queried the need for a new POPs inventory when this was already available through the NIPs. The corresponding adjustment made to the Project Document was a clarification that, under the NIPs, preliminary inventories were prepared of DDT, POPs stockpiles and other obsolete public health pesticides in Project countries, but that the Project would pay more attention to detailed inventories and to update inventories as part of a comprehensive disposal plan. In retrospect, the updated inventory was justified because the final amounts differed from those initially estimated. The allocated budget was intended to cover the repackaging, transportation and destruction of about 100 tonnes of POP pesticides.

2.3.2 Role of FAO

The STAC recommended at its first meeting in November 2008 that FAO implement Component 3 of the Project. The selection of FAO was justified by the Organization's expertise in capacity-building for the collection, repackaging and disposal of POP pesticides and because the involvement of FAO would ensure that the Project's activities under Component 3 would be complementary to similar activities in the Region.

At the second STAC meeting in July 2009, the FAO expressed its keen interest to collaborate with WHO and UNEP in the Project on Component 3. Also, FAO and WHO have ongoing collaboration in relation to the activities under the International Code of Conduct on the Distribution and Use of Pesticides.

In the third STAC meeting in July 2010, a delay was reported in the preparation of the Letter of Agreement between WHO and FAO due to the newly introduced format for Letters of Agreement between United Nations agencies at the beginning of 2010. The Letter of Agreement, outlining the outcomes, activities, budget and work plan for the execution of component 3, was eventually signed on 3 July 2010. Since then, FAO has taken the lead in the activities of Component 3 and has collaborated closely with the WHO Regional Office for the Eastern Mediterranean. The number of missions by FAO experts or consultants to Project countries was purposely kept to a minimum in order to conserve project funds for safeguarding

and disposal, with one mission to the Islamic Republic of Iran in 2011, one to Jordan in 2011, and one to Morocco which was in conjunction with a STAC meeting in 2011 (Annex 8).

2.3.3 Selection of priority countries

The criteria for selecting countries to be included in component 3 were that there were well-defined and documented DDT stocks, and that there were no other sources of funds that could be mobilized to support disposal. In 2009, the STAC selected the Islamic Republic of Iran, Jordan and Morocco as priority countries under Component 3:

a) **Islamic Republic of Iran**: the Islamic Republic of Iran was reported to have a well-defined stock of 17 tonnes of DDT distributed between approximately 20 stores. There were no other sources of funding to address the disposal of this stock. The country also has 52 tonnes of other POPs and obsolete pesticides in the agriculture sector. Although these stocks will not be disposed of by this project, the capacity built will assist the country to develop a detailed inventory and safeguarding strategy.

b) **Jordan**: Jordan was reported to have a single central store containing 23 tonnes DDT. No other sources of funding were available to address the disposal of this stock. Jordan identified the need for capacity-building in chemicals management.

c) **Morocco**: Morocco has completed its inventory under the ASP and has identified 50 tonnes of DDT which will be repacked and centralized using Ministry of Health and SAICM funds. It was reported that in the event of an outbreak of vector-borne disease, there is the risk that authorities would revert to using DDT stocks. In completing its detailed inventory for the ASP, Morocco had indicated a funding shortfall of US$ 900 000 in the ASP budget line for safeguarding and disposal. Therefore, the project will fund the disposal of these DDT stocks to ensure their early elimination.

The rationale for NOT selecting the other five Project countries under Component 3 was:

a) The Syrian Arab Republic possessed only two tonnes of DDT which were safeguarded in 2005 and disposed by the French hazardous waste management contractor, Tredi in June 2010 under the FAO project “Prevention and Disposal of Obsolete Pesticides in Syria”. The country will benefit from capacity-building in chemicals management under the FAO regional initiative.

b) It was anticipated that Egypt would be included in the second phase of ASP, with support from the World Bank.

c) Djibouti and Sudan prepared indicative inventories that showed large but undefined volumes of obsolete pesticide stocks. These volumes were considered to be too large to be adequately addressed by the Project. Both countries were eligible for funding under the ASP and were encouraged to request FAO for financial assistance from the ASP.

d) Yemen has previously received support from FAO for the disposal of all pesticide stocks.

2.3.4 Capacity-building

Capacity-building for updating of inventories was conducted in the three priority countries only. Resources were considered to be insufficient to conduct capacity-building and inventories in all eight Project countries. This is a departure from the indicator of

Component 3, which states that "Inventory of all POP pesticides in the 8 participating countries completed by PY3". The decision to limit to three countries is logical because only in these countries the Project will be able to support the disposal of POP pesticides. A reasonable assumption is that in the other five countries, capacity-building for inventories is included in the ASP and other programmes.

As an indication of the requirements for capacity-building, the teams from the three priority countries reviewed their stock records of POP pesticides. Inception workshops, including stakeholder analysis, and inventory training on POP pesticides were conducted in the Islamic Republic of Iran and in Jordan with participation of the Ministries of Health, Agriculture and Environment and with technical assistance by an international expert from FAO.

In the Islamic Republic of Iran, the inception workshops and inventory training were combined. In Jordan, a training course was conducted in 2011 on methods of inventory, safeguarding and risk assessment of POP pesticides for 9 participants from different sectors. The training included practical exercises on the use of protective equipment and methods for inventory data management. Data on obsolete pesticides were compiled and included in the FAO Pesticides Stock Management System (PSMS). In Morocco, practical training on pesticide management, repackaging, cleaning up of contaminated soils, and data stock management was conducted in 2010 and 2011. This activity was supported by the SAICM/QSP, not by the Project.

Regarding the need for equipment, FAO provided an indicative list of equipment required for inventory. Countries were encouraged to identify equipment, vehicles, offices, and staff that could be made available as contributions to the implementation of Component 3.

2.3.5 Inventory

The inventory and stock management activities in the Islamic Republic of Iran and Jordan were undertaken by trained national teams from the Ministry of Health, Ministry of Agriculture and Ministry of Environment with supervision provided by an international expert of FAO. By July 2012, the STAC reported that inventories of Ministry of Health stocks of DDT and DDT contaminated waste had been completed in the three priority countries, and that the inventory data had been uploaded to FAO's pesticide stock management system (PSMS) as a database resource for the purpose of the international tender for safeguarding and disposal.

In the Islamic Republic of Iran, approximately 22 554 kg of DDT was reported from 13 Ministry of Health stores, with large distances between stores. There was a medium to high level of DDT contamination at several sites and a need for decontamination of the surface of all stores. In Jordan, 22 277 kg of DDT was reported from one major store and smaller amounts of other POP pesticides from a second store. In Morocco, 48 081 kg of DDT was reported from 10 stores located in 8 provinces, but all stocks have now been centralized at the main store at Oued Zem, with support from SAICM/QSP.

The result of the full inventory, presented in Table 1, indicates a total of 120 tonnes of waste, of which 93 tonnes is DDT. The amounts in the full inventory were substantially higher than those in the budget for Component 3. The total budget was calculated for the disposal of 100 tonnes. Hence, the actual amounts for disposal (including waste) are 20% higher than was envisaged.

Table 1. Result of the full inventory in the three priority countries

Country	Pesticides (kg)			Contaminated containers (kg)	Liquid contaminated waste (wash water) (kg)	Total (kg)
	DDT	Other solid	Other liquid			
Islamic Republic of Iran	22 599	2118	530	5918	1335	32 500
Jordan	22 277	280	175	1800	1500	26 032
Morocco	48 081	–	–	11 566	2000	61 647
Total	92 957	2398	705	19 284	4835	120 179

2.3.6 Centralizing and safeguarding

It was recommended that each of the three countries should identify a location close to the port of export to be used as central store for all the repackaged DDT. After the tendering process has been completed, contracts should be prepared to expedite the centralization and safeguarding of POP pesticides in the three countries.

In the Islamic Republic of Iran, centralization of DDT stocks from the 13 distant stores is being planned. The Ministry of Health has committed its co-financing contribution by paying for all transport and centralization. Safeguarding will be conducted in 2013. In Jordan, DDT stocks are already centralized, and safeguarding is planned to be completed by June 2013.

In Morocco, SAICM/QSP provided the support for the collection, and centralization of all stocks of DDT and all contaminated materials (cardboard drums, plastic drums, and contaminated material) in the main store of the Ministry of Health at Oued Zem. It was also assumed at the time of allocating the Project budget for Component 3 that SAICM/QSP would repackage all the DDT stocks into UN-approved drums, but it was reported that only part of the DDT had been repackaged and that the containers used were not approved for international shipment. Safeguarding equipment was procured by the SAICM/QSP but, unfortunately, there has been a funding shortfall for the intended repackaging of DDT in the proper drums. The safeguarding in Morocco has been planned for June 2013.

2.3.7 Preparations for shipment and disposal

It became clear that the funds available in the budget for disposal under Component 3 were inadequate, despite the contributions from other stakeholders (national governments, ASP, SAICM). This shortfall was due to several reasons. First, the quantities of POPs in the updated inventories in the three countries were 20% larger than expected. Second, there had been an increase in the unit costs of disposal, causing an estimated increase of 12% of overall cost of disposal. The original budget was based on a price for shipping and disposal of US$ 2000 per tonne of safeguarded stocks in all countries. In February 2010, FAO investigated the cost estimate and increased the unit cost for the Islamic Republic of Iran and Jordan to US$ 2600 per tonne. Prices for Morocco remained US$ 2000. Third, the actual cost of safeguarding and disposal by a contractor was much higher than foreseen.

To cut costs, it was requested that countries make an effort to utilize national budgets or seek other funds to allow for disposal of the large quantities of non-DDT waste. This way, the Project funds could prioritize the disposal of DDT.

The Islamic Republic of Iran intended to dispose of all DDT, other pesticides and contaminated materials. This would require more funds than those allocated under the Project budget. Hence, it was envisaged that funds would be needed from the Project in addition to what had already been allocated. In turn, the government would finance the disposal of non-DDT waste. The government confirmed that the additional costs for transport and centralization of stocks and waste would be covered by Ministry funds.

Likewise, the need for substantial additional costs for disposal were reported from Jordan. This was because costs for personal protective equipment and packaging materials had been excluded from the original budget. In turn, the Ministry has confirmed its additional contribution by providing the use of stores during the safeguarding. Also Morocco reported the need for additional funds for safeguarding (personal protective equipment, safeguarding equipment and tools, supervision and labour) and for disposal.

Hence, in 2011 the STAC indicated that the additional funding would be required to cover the extra amounts in the full inventory relative to those in the original budget for Component 3 in the three selected countries. The additional amount needed was estimated at US$ 110 000, but this estimate was made before the bidding for the tender was conducted (as it turned out, a much higher amount of additional funds would be needed for Component 3). The STAC recommended that the additional funds be re-allocated from other Project components to Component 3, and that WHO would manage the re-allocated funds in consultation with FAO. This re-allocation has been approved.

2.3.8 Tendering

The shipment and disposal activities will be undertaken by a hazardous waste disposal contractor through an international tender. A tender process has been initiated. The bid requested quotations for two options: A, in which the government undertakes safeguarding; and B, in which this is done by the contractor.

The STAC reported that eight companies responded to the request for expressions of interest; 6 companies met the mandatory conditions, 4 companies submitted bids, and 3 bids were considered valid. The evaluation criteria used by FAO in the tendering are: mandatory requirements (disposal facility licensed for DDT; compliant with Basel Convention), price (80% importance), and technical evaluation criteria (20%). The lowest bidder was Tredi, with a total of US$ 554 353 for option B for the three countries. After evaluation of the tender and after negotiation with the best candidate, FAO contracted Tredi, reportedly for the amount of US$ 548 253. This company is now processing the Basel Authorizations for the shipment of chemical waste.

With a total cost of US$ 548 253 for option B, there will be a large shortfall in the current budget for Component 3. Options to deal with this shortfall were: (a) to re-allocate Project funds to Component 3, or (b) to reduce costs, e.g. by increased utilization of country contributions, excluding contaminated packaging and other pesticides, and limiting the number of countries.

The STAC had decided upon the request of the countries that option B (the comprehensive option) would be preferable; thus, the tender would include the repackaging, transportation and disposal of all the stocks and contaminated wastes. The implication of this decision,

however, was that previously committed country contributions to Component 3 would become superfluous. Therefore, the STAC recommended that countries transfer their previous commitments made (in labour and transport) to other components of the Project where it would result in actual cost savings for the Project. In accordance with the tender, the STAC recommended that WHO should increase the budget for Component 3 by a maximum of US$ 336 000. An amendment to the agreement between WHO and FAO has been made, signed 5 September 2012, raising the original contribution of US$ 400 000 to the new figure of US$ 736 000 and extending the end date to 31 December 2013. It is expected that the safeguarding and disposal in all three countries will be completed in 2013.

2.3.9 Summary and recommendations, Component 3

The Project has gone through a systematic process of selecting priority countries, carrying out capacity-building, inventories, and (in some situations) centralization and safeguarding of POP pesticides, benefiting from the expertise of FAO. Despite the delayed start of the Letter of Agreement due to administrative reasons, good progress has been made in the past two years. The activities in the priority countries are on track and the tender process has resulted in a comprehensive contract for safeguarding, shipment and disposal. The disposal is expected to be completed in 2013.

The activities under Component 3 are an example of multi-stakeholder planning and implementation. Government funding and in-kind contributions were mobilized in the capacity-building, inventories, and (in some cases) centralization and safeguarding. In Morocco, the Project activities were planned to complement the activities under the ASP and SAICM/QSP.

The Project's log frame presented two indicators for outcomes of Component 3. The first indicator is "Up-dating of the inventories of all POP pesticides in the 8 participating countries completed". This indicator needs revision because, as mentioned in 2.3.4, it was decided early in the Project that the updating of inventories was required only in two of the priority countries, not in all eight Project countries, because only in priority countries the Project would be able to support the disposal of POP pesticides.

The second indicator refers to "the collection, repackaging, and disposal of at least 100 tonnes of POP pesticides from 4 countries not covered by the ASP". The Project is well on its way towards disposal of 120 tonnes of POP pesticides and waste. Disposal is conducted for 3 countries, not 4, and adequate justification has been given for NOT including disposal in the other Project countries.

It is unfortunate that the costs for safeguarding and disposal by an international contractor were under-estimated by a large margin, necessitating a drastic re-allocation of funds at an advanced stage in the project. Both UNEP and FAO based the original budget on the generally prevailing price of US$ 3500/tonne for safeguarding and disposal. Since then prices have risen, particularly for shipping. It has been noted that the actual unit costs for safeguarding and disposal for the project countries are close to the norm published by the GEF, but for the Islamic Republic of Iran, where centralization of stocks had not been completed, the unit cost is higher.

Nevertheless, if these risen costs had been known to the STAC earlier on, this could have (partly) averted the re-allocation of project funds from other (important) Project components to Component 3. For example, an early decision could have been to select two instead of three countries for disposal activities, in accordance with the allotted funding. Hence, this would serve as a lesson learnt.

2.4 Component 4: Information on good practices and demonstrated cost-effective and sustainable alternatives are taken up by national institutions and in planning processes

2.4.1 Background

The Project document stated that "the crux of this project is its regional dimension, pulling together the experiences and results of projects in the participating countries. Analysis and reporting are therefore critical components in order to achieve the ultimate goal of the project: the reduction of reliance on DDT and of the tendency to revert to DDT." The STAC reiterated the value of a regional dimension of the Project. Accordingly, the demonstration studies in four countries are expected to contribute to a regional information base for use by other countries in the Region, and beyond. Likewise, the experience gained in capacity-building on IVM and pesticide management in individual countries can provide useful examples for other countries. Hence, it is important that the results of Project activities will be effectively disseminated for use by other countries so that information on good practices on alternative methods and strategies is shared.

2.4.2 Performance and recommendations, Component 4

The Project document proposed the following activities on dissemination: "Prepare and publish a report and/or article for peer-reviewed literature to give wide dissemination to the outcome of the national studies, the regional analysis, and lessons learnt through consultants' services. Reports will be translated into English, French and Arabic. Provide support for the creation of dedicated web-pages (in English, French and Arabic) to make information available through the internet." The activities under Component 4 had been planned for the final financial year and, thus, can only be assessed in the final evaluation. Nonetheless, there has already been some progress reported by mid-term.

By mid-term, two articles have been published by WHO in the *Eastern Mediterranean Health Journal*. These articles provide a review of the situation and achievements made in Component 2 with regard to policy development for IVM and pesticide management, respectively (*12*,*14*). Regarding Component 1, the progress made so far suggests that several technical publications will be forthcoming, particularly in relation to the studies in Sudan and Morocco. Technical publications may appear before the end of the Project, but due to the timeline of the studies and the peer-review process it is likely that publication will only be after the Project has been completed. Hence, it is **recommended** that before the Project's end, the substance of any planned articles is produced in report format so that it can be covered in the final evaluation.

Once the results of a demonstration study have been completed and documented, the translation into English, French and Arabic will be required to allow for wide dissemination

of national studies across the Region. This activity, which will be facilitated by the WHO Regional Office for the Eastern Mediterranean, has not yet been conducted but has been planned for the final financial year.

To enable the sharing of information and experiences between countries through consultant services, the STAC proposed to establish a roster of regional experts who have gained expertise from participation in Project activities. The Project's progress report indicated that this activity is on track, with 40% achievement by the WHO Regional Office for the Eastern Mediterranean and Project countries in 2012. It is **recommended** that details on the status of the roster, how it will be used to benefit other countries, and how it will be managed beyond the end of the Project, will be described.

Project results should be shared at seminars and conferences to audiences within and outside of the Region, particularly audiences that include policy makers and programme managers. Another platform for dissemination of results on good practices is through dedicated web pages in the Region's main languages. The Project's progress report indicated that this activity has been initiated. As most information on good practices will only be available towards the end of the Project, it is **recommended** that a plan is produced on how the web pages will be managed and maintained beyond the end of the Project.

Ultimately, the purpose of dissemination is that the shared information can be utilized by recipient countries or institutions, thus mobilizing additional resources for implementation of good practices. The achievements in this area at mid-term are not known. Effective utilization of information and lessons learnt is no simple matter, because it requires appropriate technical and operational guidance on how to transfer the results obtained in one country to countries with different eco-epidemiological and operational settings. Therefore, it is **recommended** that WHO and the STAC prepare the required guidance for dissemination alongside the results on good practices. This refers to vector control methods, IVM strategies and pesticide management.

2.5 Component 5: Trans-boundary coordination, information sharing and monitoring and evaluation mechanisms operational and effective in promoting IVM without the use of DDT

2.5.1 Background

The Project's design with its rather diverse activities in eight countries, and incorporating a strong regional dimension, demands a major role for coordination at the country and regional level. This is addressed in Component 5. The Project document identified the need for strengthening of regional, trans-boundary and national coordination, information sharing, effective monitoring and evaluation, management capacity, and the designation and recruitment of national project coordinators and national steering committees and the establishment of a regional Scientific and Technical Advisory Committee (STAC).

2.5.2 Project coordination, monitoring and evaluation

The posts of a full-time Project coordinator and full-time Programme Assistant (Secretary) were assigned in March 2009. To assist the Project coordinator on technical matters and to

ensure harmonization and coordination of project activities between the regional Office of WHO and the participating countries, a full-time Assistant Technical Project coordinator post was filled in August 2010 until September 2012 with a secondee from the Government of Sudan, as co-financing contribution by that country. The project coordinator and secretary positions were made available by the WHO Regional Office for the Eastern Mediterranean, as part of its in-kind contribution to the Project. The terms of reference for these staff have been prepared by WHO at Project inception.

Regarding staff changes, the Project Coordinator changed in September 2011, but this was a smooth transition because the new person had been closely involved in the Project. The position of Assistant Technical Project Coordinator has been vacant since September 2012; this is advertised as a WHO position and is expected to be filled again soon. Also, the position of Secretary is vacant since January 2013, but will be filled again soon. It is also important to mention that in 2011, an organizational restructuring took place at the WHO Regional Office for the Eastern Mediterranean, which may have influenced project management to some extent.

Eight national project coordinators were assigned in June 2009, as part of country Government contributions to the Project. To facilitate trans-boundary and national coordination, the STAC agreed on the following activities: to coordinate the Project activities, share information on outcomes of Project activities between countries, institutionalize border coordination as part of information sharing, and conduct ongoing monitoring and evaluation of the proposed project activities. Where border coordination for malaria control or elimination already exists among neighbouring countries, the Project should build on the existing coordination.

Thus far, the communication with, and response from, National project coordinators from several countries has been rather poor. The STAC in its third meeting had requested Project countries to submit progress reports every six months. However, only 4 of the 8 project countries did submit an annual report in 2011 for the fourth STAC meeting, and only two countries submitted their annual reports in 2012 for the fifth STAC meeting. An additional problem is that in Djibouti there has been a high turn-over in the National Coordinator position.

Apparently, the current mechanism for communication and response is not satisfactory in all Project countries. It is **recommended** that the STAC evaluates the mechanism of communication between the regional level and national project coordinators, and revisits the reporting procedure, in order to suggest improvements where needed.

With regard to information sharing, the WHO Regional Office for the Eastern Mediterranean has initiated a regional database on insecticide resistance and vector distribution in response to the problem of insecticide resistance in the Region. Also, a consultative meeting was held in September 2012 in Casablanca, Morocco, to discuss implementation of the Global Plan for Insecticide Resistance Management (GPIRM) of WHO (*15*).

2.5.3 National steering committees

National Steering Committees were established in Project countries during the PDF-B phase as a group of stakeholders that participated in the national consensus workshops at initiation of the PDF-B. Details on the ministries represented in the national steering committees in each

country have been given in the Project document. It was noted that only Sudan had managed to include stakeholders from civil society and the private sector into their national steering committee during the PDF-B. Morocco had civil society participation in its IVM committee at local-level, but not at national level. It remains unclear whether the other countries have also added members of civil society and the private sector to their steering committees.

The specific tasks of the national steering committees have been outlined as part of the consolidated work plan prepared at the second STAC meeting. The tasks of the national steering committees are to oversee and guide the implementation at national level (including the protocols for demonstration projects), and to carry out monitoring and evaluation (Annex 7). Moreover, the Project document stipulated that each national steering committee should review project implementation twice a year and prepare a comprehensive annual report on the progress made to the executing agency for the preparation of annual reports. However, documented information regarding the meeting events and annual review of country-level implementation in Project countries is limited. It has been noted that the national steering committees in Morocco and Sudan have met regularly to review progress of activities. In Morocco, IVM steering committees at the national level and at the local level (8 provinces) meets at least twice per year. In Sudan, the project steering committee met at 3- or 6-month intervals to discuss implementation, face challenges, and provide support on the interpretation of study results; Sudan has established a separate intersectoral committee on IVM which also includes civil society.

Egypt reported that meetings of the IVM steering committee have recently taken place on a monthly basis at national level, involving six ministries, and the formation of IVM committees in governorates is planned. Yemen established an IVM steering committee in 2006 which remained inactive until it was revived in 2012; between May 2012 and May 2013, the steering committee met seven times. In the Islamic Republic of Iran, the national steering committee has reportedly been meeting regularly. In Jordan, the national steering committee met only during 2005 and 2006. Likewise, in Djibouti, no meetings were reported since establishment of the committee in 2006; the committee was temporarily revived in 2011 but no subsequent meetings took place.

2.5.4 Regional Scientific and Technical Advisory Committee (STAC)

The Scientific and Technical Advisory Committee (STAC) was established to provide overall guidance for the implementation of Project's activities. The STAC's tasks, outlined in the Project document, are to review national work plans and protocols, to advice on capacity-building, to conduct annual reviews of project progress based on reports from national coordinators, to advice on challenges, constraints and problems in the implementation of national work plans, and to advice on stakeholder involvement, sustainability and replicability of the Project's activities.

The STAC has 5 core members and several additional members with expertise in a number of specific areas. Meetings of the STAC were originally planned to be held twice per year. However, because the cost of these meetings was higher than expected, the STAC agreed during its second meeting in July 2009 to schedule its meetings only once per year. UNEP participated in every STAC meeting. Where possible, the annual meetings were held back-to-

back with other meetings, to share travel costs between projects or Project components (Table 2.1).

The outcomes of the meetings have shown that the STAC has played an important role in guiding, monitoring and evaluating the Project's activities and, thus, the STAC's existence appears to be justified. The benefits of the STAC have so far been manifested in several ways. The STAC has provided:

- continuity in monitoring and evaluation through its annual meetings;
- a forum for development and harmonization of methodology for demonstration projects;
- much-needed coordination and guidance on diverse activities conducted in eight countries; and
- opportunity for capacity-building and interagency collaboration due to the participation of experts from universities and FAO.

It is essential that annual STAC meetings will be continued in the years ahead. It is **recommended**, however, that the upcoming annual STAC meetings pay increased attention to Project Components 2 and 4. Project Component 2 in particular has not profited from consultant and expert services as compared to Components 1 and 3, and thus it risks under-performance if not given more explicit consideration by the STAC.

It is also **recommended** that upcoming STAC meetings should be planned in such a manner that it allows for concurrent field visits by participants to demonstration projects. Also, as was discussed in 2.5.2, the STAC should rework the reporting procedure from the national level to the regional level, in order to suggest improvements in progress reporting. In general, there is a need to strengthen the linkages between STAC members and country teams, in particular, because it has been noted in 2011 that the expertise of STAC members has not sufficiently been utilized by Project countries.

Table 2.1 Details of STAC meetings

STAC meeting	Meeting dates	Meeting place	STAC members	Country representatives	Countries not represented
I[a]	2-3 Nov 2008	Amman, Jordan	8 out of 13	12	Djibouti
II	1-3 Jul 2009	Cairo, Egypt	8 out of 13	10	Djibouti
III b	12-13 Jul 2010	Damascus, Syrian Arab Republic	6 out of 13	8	Djibouti
IV	13-15 Jul 2011	Marrakesh, Morocco	6 out of 12	10	None
V c	10-12 Jul 2012	Cairo, Egypt	5 out of 12	7	Islamic Republic of Iran

[a] Back-to-back with the 1st intercountry meeting of national vector control focal points, 4-6 Nov 2008
[b] Back-to-back with training workshop on cost-effectiveness analysis of DDT alternatives, 14-16 Jul 2010
[c] Back-to-back with meeting of WHO/GEF project "Establishment of efficient and effective data collection and reporting procedures for evaluating the continued need of DDT for disease vector control", 9 Jul 2012

3. PROJECT FINANCES

3.1 Project budget and revisions

The budget, with the approved revision, is summarized in Table 1, with the detailed budget lines presented in Annex 4A. Revisions have been made, and approved by UNEP, in the allocations to consultants, sub-contracts, trainings, meetings, equipment, reporting and evaluation. Under the budget line for consultants, major reductions have been made in the allocations for review of policy/legal frameworks on IVM and development of guidelines on vector control. The main reason for these reductions was the increased co-funding contribution from WHO and governments. Conversely, the consultant budget line on obsolete POPs showed a major increase in the revision. The reason was to allow for an increased quantity of POPs to be disposed (see section 2.3). Overall, the budget for consultants has been increased by US$ 50 000.

Table 3.1 Project summary budget, with original allocation, change, revision, and the actual and % expenditure by 31 December 2012

Budget line	Description	Original GEF allocation	Change	Approved revision	Expended, 31-Dec-2012	% Expended
1. Project personnel						
1199	Project personnel	–	–	–	–	
1299	Consultants	774 000	50 000	824 000	787 677	96%
1699	Travel on official business	100 000	–	100 000	49 734	50%
1999	**Component Total**	**874 000**	**50 000**	**924 000**	**837 411**	**91%**
2. Sub-contracts						
2199	UN agencies	293 334	66 668	360 002	242 068	67%
2299	Non-profit organizations	1 498 100	(91 968)	1 406 132	1 014 430	72%
2399	Commercial purposes	–	–	–	–	
2999	**Component Total**	**1 791 434**	**(25 300)**	**1 766 134**	**1 256 498**	**71%**
3. Training						
3199	Fellowships	–	–	–	–	
3299	Group training	579 000	68 000	647 000	405 810	63%
3399	Meetings/conferences	162 480	222 400	384 880	279 833	73%
3999	**Component Total**	**741 480**	**290 400**	**1 031 880**	**685 643**	**66%**
4. Equipment & premises						
4199	Expendable equipment	–	–	–	–	
4299	Non-expendable equipment	–	43 000	43 000	42 085	98%
4399	Premises	–	–	–	–	
4999	**Component Total**	–	**43 000**	**43 000**	**42 085**	**98%**
5. Miscellaneous						
5199	Operation and maintenance	–	–	–	–	
5299	Reporting costs	216 500	(146 500)	70 000	42 833	61%
5399	Sundry	–	–	–	–	
5499	Hospitality and entertainment	–	–	–	–	
5599	Evaluation	336 600	(211 600)	125 000	17 930	14%
5999	**Component Total**	**553 100**	**(358 100)**	**195 000**	**60 763**	**31%**
Grand total		**3 960 014**	**–**	**3 960 014**	**2 882 400**	**73%**

Furthermore, there has been a 67% increase in the budget for sub-contracts to WHO, which according to WHO was attributable to a wrong calculation in the original budget. Meanwhile, the budget for sub-contracts to non-profit organizations was reduced mainly because the mid-term and final evaluations were moved to new budget lines.

The budget line for meetings and conferences has been substantially increased by 140%. According to WHO, the reason for this increase is to cover the increasing cost of STAC meetings and the contribution to the regional consultation on insecticide resistance held in 2012. Moreover, the cost of travel increased whereas extension of the Project to the end of 2014 implies the need for an additional STAC meeting. Considering the important role of the STAC and its annual meetings, this budget revision seems justified.

Non-expendable equipment was initially not budgeted for. In the revised budget, an allocation of US$ 43 000 for equipment was allowed because countries had to procure new equipment for the specific purpose of their demonstration activities.

Major reductions were made in the revised budget lines for reporting costs and evaluation. Reporting costs could be reduced because several documents, such as IVM guidelines, vector control guidelines and reports had been developed by WHO headquarters and the Regional Office for the Eastern Mediterranean from WHO resources as co-finance. Also, it has been indicated that evaluation activities are being covered by WHO, national governments and other partners as co-financial contribution.

Project financing of outcomes and activities under each Project Component as indicated in the Project Document are presented in Annex 4b. Contributions of the GEF, governments and WHO are indicated.

3.2 Expenditures, GEF funds

In total, 73% of GEF Project funds were spent by 31 December 2012 (Table 3.1). This figure includes upfront transfer of funds for POPs disposal to FAO under the agreement with WHO. Even though the revised budget for consultants had been increased by US$ 50 000, this increased budget line has been spent for 96%. This can be explained by the large portion of consultancy funds disbursed to FAO under the agreement with WHO (i.e. specifically for implementation of Component 3). Budget lines for travel, reporting and evaluation remain relatively underspent, but these items should receive increased attention in the remaining years. For example, monitoring and evaluation by WHO has been underspent, with over half of the budget available for the remaining Project period.

Table 3.2 shows the expenditure in individual countries and by FAO. The largest expenditure in an individual country has been in Sudan, which can be explained by the large scale of the demonstration project.

Table 3.2 Expenditure (in US$) over the period 2009–2012 in Project countries and by FAO

Organization	Expenditure
Djibouti, WHO Representative's Office	31 750
Egypt, WHO Representative's Office	101 091
Islamic Republic of Iran, WHO Representative's Office	41 949
Jordan, WHO Representative's Office	18 784
Morocco, WHO Representative's Office	154 930
Sudan, WHO Representative's Office	586 125
Syrian Arab Republic, WHO Representative's Office	112 279
Yemen, WHO Representative's Office	148 166
FAO	736 000
Total	**1 931 074**

Table 3.3 Budget under the agreement between WHO and FAO for disposal of POPs

Description	Original budget	Change 05-09-12	Revised budget
Salaries professional	–	26 566	26 566
Consultants	38 033	–	38 033
Contracts	186 000	362 253	548 253
Locally contracted labour	–	–	–
Travel, duty travel others (FAO staff only)	10 000	3000	7000
Travel, international consultants	20 000	–	20 000
Travel, non-staff (counterparts)	22 000	7000	15 000
Training	–	–	–
Expendable equipment	45 000	35 000	10 000
Technical support services	47 799	29 800	17 999
General operating expenses	5000	–	5000
Support costs (7%)	26 168	21 981	48 149
Total	**400 000**	**336 000**	**736 000**

Table 3.3 shows the budget for the GEF funds that were transferred to FAO under the agreement with WHO. A revision to the budget was made in the amendment to the agreement between WHO and FAO on 5 September 2012. The budget was increased by US$ 336 000, which is mainly due to the requirement for contracting the waste disposal company.

3.3 Expenditures, co-financing

WHO reported in 2012 that co-financing by most Project countries is secured and has so far been provided as needed. Nevertheless, the WHO also mentioned that difficulties have been faced in the preparation of a co-finance report, presumably due to delayed or incomplete reporting by countries.

Table 3.4 presents the available data on co-financing expenditures. Overall, US$ 5.7 million in co-financing has been reported, which is 68% of the commitment given in the Project Document. This is a satisfactory result, especially when considering that these figures have under-estimated the actual co-financing expenditures by countries at mid-term. For instance, Djibouti has not yet reported, and several other countries have reported only up to 2011 or have not provided comprehensive reporting of co-financing expenditures.

Some comments can be made to explain certain figures in the table. Yemen indicated a major expenditure on equipment, which was primarily for the purchase of insecticides, spray

equipment and long-lasting insecticidal nets. The major expenditure for equipment in the Syrian Arab Republic was not further specified and needs to be clarified. Sudan only reported co-financing in the budget line for personnel, but it is evident that co-financing has also been provided in other budget lines; for example all costs of IRS campaigns were contributed by the government. The WHO has exceeded its committed co-financing contribution by a large margin, primarily due to its provision for three staff positions.

3.4 Projected expenditures

Projections have been made by WHO for expenditures in 2013 and 2014, following the approval of a no-cost extension of the Project until 31 December 2014 (see Annex 4a). Only 27% of the GEF funds will be available for use in the remaining two years. The increased funding requirements under Component 3 of the Project (Disposal of POPs) are safeguarded under the separate agreement with FAO for which the funds have been disbursed (Table 3.2). Despite the 96% of funds for consultants have been spent, this still leaves sufficient funds for analysis of data sets in 2013 and 2014 (see Annex 4a). It is also hoped that remaining funds will be adequate to complete the demonstration studies in countries.

Sufficient funds are available for monitoring and evaluation, STAC meetings, training courses, national seminars and reporting. It is imperative that these resources are used in a way that will gain maximum leverage from the investments made in the demonstration project, IVM capacities, and information sharing. Therefore, it is **recommended** that an updated strategic plan for these activities is made that takes into account the findings and recommendations of this mid-term review with respect to all project components and using synergies between project components (e.g. between demonstration projects and IVM capacity).

3.5 Summary

The amendments made in the budget appear to be appropriate and consistent with the recommendations by the STAC with the aim to support effective project implementation. A major shift of funds to Project Component 3 was necessary in order to support the disposal of additional POPs encountered in Project countries. The implication of this re-allocation is that fewer GEF funds will be available for demonstration projects and IVM capacity-building. Overall, 73% of GEF funds have already been spent, and the use of remaining funds should be carefully planned to maximize their contribution towards final Project outcomes and impacts, taking into account the technical recommendations of this mid-term review. Available information indicates that co-financing has so far been provided as needed.

Table 3.4 Co-financing expenditures in relation to commitments given in the project document

UNEP budget line/Object of expenditure	Country/organization (with year of last reporting)									
	Djibouti (no report)	Egypt (2011)	Islamic Republic of Iran (2012)	Jordan (2012)	Morocco (2012?)	Sudan (2011)	Syrian Arab Republic (2011)	Yemen (2011)	WHO (2012)	Total
Project personnel	–	106 400	62 900	126 600	576 241	417 000	192 941	21 500	1 952 000	3 455 582
Sub-contracts	–	–	10 000		–	–	–	–	–	10 000
Training	–	32 330	10 000	39 720	36 260	–	111 400	107 900	–	337 610
Equipment, premises	–	100 950	–	70 000	126 880	–	300 170	708 852	143,268	1 450 120
Miscellaneous	–	22 340	–		–	–	38 856	56 600	169,000	286 796
Total (A)	**–**	**262 020**	**82 900**	**417 080**	**739 381**	**417 000**	**643 367**	**884 852**	**2,264,268**	**5 710 868**
Commitment (B)	1 038 912	435 141	675 891	631 892	870 642	703 142	685 141	2 170 141	1,205,500	8 416 402
Balance (A-B)	1 038 912	173 121	592 991	214 812	131 261	286 142	41 774	1 285 289	1,058,768	2 705 534

4. SUSTAINABILITY

The sustainability of the Project's outcomes will be manifested at several levels: the political will, financial sustainability, insecticide resistance, and community participation.

The political will to implement alternative vector control methods in the context of an IVM strategy has been demonstrated by Project countries through their co-funding contributions to the Project and through their achievements in policy development and institutional arrangements in relation to IVM, reported in section 2.2.

Nevertheless, a challenge remains for countries to formally approve and actively implement the new IVM policy, for example, by making adequate adjustments in government budget allocations for IVM capacity-building and surveillance. There is the risk in some Project countries that the IVM strategy is not sufficiently supported by political will and capacity-building by public sectors. Hence, it is **recommended** that the STAC gives continued emphasis to the implementation of activities under Project Component 2. In this regard, the development and adoption of a regional resolution and framework for action on managing the use of public health pesticides (*10,11*), in which the Project has played an important role, may be a supportive factor.

The study on mechanical control interventions of malaria vectors in the example from the Islamic Republic of Iran has demonstrated a strong support from the local governor due to its direct relevance to the existing public health problem in the city where the study is being conducted. Following this example, it is **recommended** as exit strategy that all demonstration projects should actively engage local authorities and should provide adequate guidance to ensure that positive results from the studies are correctly translated into methods and procedures for operations adapted to the local situation.

Regarding financial sustainability, the IVM approach aims to increase the efficiency and cost-effectiveness of vector control, so that human resources and chemical inputs are used in a more optimal manner with less wastage. This approach, which must be supported by appropriate policies and capacity-building, will lead to cost savings, when implemented appropriately and consistently. Moreover, the demonstration projects are producing important data on the comparable cost-effectiveness of interventions, which will help programmes in their decision-making on how to improve disease control with the available financial resources.

A major concern for long-term sustainability is the development of insecticide resistance in view of the continued reliance on insecticidal vector control methods. In the design of the studies in Sudan, Morocco and Yemen, it was decided to concentrate on the comparison between methods of LLIN and IRS when used singly, or in combination. It has been important to concentrate the available resources to implementation of as few study arms as possible to ensure measurable effects on disease prevalence. LLIN and IRS are clearly the interventions with proven effectiveness and should be prioritized for disease control. Nevertheless, this focus on insecticidal methods caused some controversy, as suggested in 2.1.7, because in Sudan multiple resistance mechanisms have been reported in malaria vectors. The close collaboration with the BMGF-funded study by the Liverpool School of Tropical Medicine on insecticide resistance is commendable, i.a. because it allows for adaptation of interventions according to the local resistance situation, for example by using the carbamate bendiocarb for IRS where

pyrethroid resistance occurs. Unfortunately, however, the LLIN intervention cannot be adapted, because pyrethroids are the only chemical class approved for use in net fabric.

The results from the Liverpool School of Tropical Medicine (LSTM) study in Sudan indicated that the effect of the LLINs might not be as high as hoped due to the high levels of resistance to deltamethrin detected in demonstration areas. Hence, the effect of LLIN may already be compromised. The LSTM expert asserted that the continued selective pressure caused by the insecticides could result in a further increase in the resistance level. These observations do not augur well for the longer term.

The conflict between short-term epidemiological impact versus long-term sustainability of vector control is a problem that is not unique to this Project, but one that is at the forefront of contemporary malaria vector control (*16*). Current strategies recommended by WHO promote the early detection of resistance in vector populations and the preventive rotation of chemical classes for use in IRS (*15*)[5]. In addition, WHO recommends an evidence-based and surveillance-based approach to planning of interventions, as part of its IVM strategy, which should result in better temporal and spatial targeting thus reducing unnecessary use of chemical interventions (*5*).

Regarding the use of non-chemical methods, the vector control task forces of the Roll Back Malaria partnership have recognized the potential role of non-chemical methods when used in combination with LLIN in malaria control and elimination programmes; the same would apply to leishmaniasis. Therefore, it is unfortunate that non-chemical methods such as environmental management have not been incorporated in the demonstration projects in Morocco and Sudan. A logical option would be an extra study arm with LLIN plus non-chemical method such as environmental management. This would have contributed to capacity-building, data generation, testing in an operational setting, and potentially reducing the reliance on insecticides for vector control. At this stage, however, the study design cannot be altered. Instead, as discussed in 2.1, it is **recommended** that the demonstration projects incorporate basic studies on vector ecology and environmental management, thus anticipating their relevance for future strategies. This preliminary work should include surveys of larval breeding habitats (including dry-season refugia), characterization of habitats, pupal productivity, and the potential for environmental management.

Ultimately, the effectiveness of IVM depends on how communities, as the Project's direct beneficiaries, comply with interventions or actively engage in vector control and personal protection. The demonstration projects have a strong focus on comparing the cost-effectiveness of interventions but should not neglect the importance of people's perceptions, acceptance and compliance with the introduced interventions. This requires additional sensitization and education. In this regard, the Project document mentioned that agricultural extension services and farmer field schools will be used to channel messages on IVM and the sound management of pesticides to rural communities, which would increase prospects for sustainability. At present, these assets have not been utilized by the Project. It is **recommended** that the countries with demonstration projects reinforce their efforts to increase community participation and explore opportunities for collaborating with agriculture on the education of rural communities.

[5] But the presence of resistance to pyrethroids and DDT restricts the options for rotation; moreover, rotation is not an option in LLIN.

5. REPLICABILITY

The Project has emphasized the value of a regional approach aiming to enhance the replication of results for the benefit of other countries. This is being addressed in several ways: regional mechanisms for coordination, monitoring and evaluation have been established; harmonization of methodology for demonstration projects carried out; and dissemination strategies have been planned of information on good practices and cost effective vector control methods. The national steering committees will serve to promote the replication and up-scaling in-country. Moreover, reciprocal visits of policy-makers and programme managers to demonstration projects will aid in the sharing of experiences with policies, institutional arrangements or implementation between or within countries.

The Project document pointed out correctly that the VCNA that was conducted in the PDF-B phase has provided an important situation analysis that can assist in determining the options and prospects for replication from one country to another country (or, for up-scaling within a country), especially if sufficient details on vector biology, disease epidemiology and environmental conditions are included in the analysis.

The demonstration project in the Islamic Republic of Iran provides an example of an appropriate technology which, with the required support, could potentially be scaled up and replicated in other cities through the participation from local authorities, the private sector and communities. Nevertheless, due to the design of the study, the demonstration project in the Islamic Republic of Iran may not be able to reveal the true impact of the technology on adult vector density or malaria prevalence.

The demonstration projects in Morocco, Sudan and Yemen used interventions of LLIN and IRS. These two vector control methods, when used as single interventions, have been shown to have a high replication value, with an impact on malaria indicators in a range of epidemiological and ecological situations, provided that local vectors feed and/or rest indoors (*17*,*18*). The effects on leishmaniasis are less known.

A more complex question, however, is whether the combination of LLIN and IRS, used in the demonstration projects in Sudan and Yemen, also has a wide-scale application value. Published reviews of available studies on the use of the combination of LLIN and IRS in malaria control in Africa have shown inconsistent results, with some studies showing an additional impact of IRS whereas in other studies, IRS did not confer additional protection over the use of LLIN alone (*19*-*24*). Also, initial results from demonstration projects indicate that the costs of interventions vary between and within countries. Hence, both, the costs and epidemiological effect of the LLIN+IRS intervention depend on a country's context. This suggests that 'appropriate studies' should be conducted in each new country before replicating the combination of LLIN+IRS.

In addition, the results obtained in one location may not be constant over time but the observed effects may change after a certain period. An LSTM expert participating in the Sudan study noted that the selective pressure caused by the insecticidal interventions could result in a further increase in the resistance level. If this is the case – and this is being monitored – this may influence the relative cost-effectiveness of each intervention.

In view of these sources of variation, an IVM strategy should embrace an adaptive management approach, in which the choice of interventions can be changed if the situation so dictates (*5*). This presumes that reliable and timely data on epidemiological impact and entomological parameters are routinely collected through a surveillance system that can be financially sustained in an operational setting. Hence, capacity on data collection, analysis and interpretation should become part-and-parcel of disease control programmes.

The adaptive management approach, however, could prove to be a major challenge. Subtle changes in the cost-effectiveness of interventions may alter the relative advantage of one intervention over another. The problem is that changes in epidemiological impact are very difficult to verify – except through rigorous experimental study, which is mostly beyond the scope of disease control programmes.

Randomized controlled trials (RCT) are thus indispensable for demonstrating the epidemiological impact of interventions in a certain situation, but the drawback of such large studies is that they are rigid and inflexible to respond to variable circumstances. Therefore, RCTs are useful for interventions with a wide application value but are less useful for interventions with more variable effects. Interventions with variable effects demand a more intuitive, adaptive management approach within the context of operational programmes.

Consequently, with regard to replicability, the question is not only whether the use of certain interventions can be replicated, but also – and especially – whether the adaptive management approach of IVM can be replicated. The latter is a relatively new area, and it is highly **recommended** that the Project will make innovative advances in establishing, testing and documenting this adaptive approach in an operational setting. Because data on disease impact are so difficult to provide for use in an adaptive approach, WHO suggested in its handbook on IVM that countries should prioritize parameters that can more easily be studied and used in decision-making, such as entomological, human and environmental variables (*5*).

Such parameters can be important determinants of the effectiveness of interventions, and thus allow for a flexible use for evidence-based decision-making. For example, a decision to replicate IRS into a new area must be supported by targeted surveys to determine vector resting and biting behaviour, insecticide susceptibility, efficacy using cone bioassays, and people's compliance with the intervention (i.e. are sprayed surfaces left intact?). The challenge with the adaptive approach is that monitoring of activities and evaluation of outcomes will be less straightforward as with linearly planned activities. Nevertheless, it is felt that capacity-building on an adaptive approach of IVM is urgently needed by disease control programmes and this should be further emphasized by the Project in the remaining period.

6. STAKEHOLDER INVOLVEMENT

Intersectoral collaboration is one of the five key elements of IVM. The policies and programmes of various sectors have a bearing on the risk of vector-borne diseases, often unintentionally. The sectors of agriculture, environment, construction, energy, local government and private sector all influence the breeding of vectors or the contact between vectors and humans. Consequently, involving these stakeholders in the Project is of major importance to the performance and impact of Project activities.

The VCNA process carried out in the PDF-B phase was used to identify key stakeholders, and their potential role, in each project country and to invite representation in an intersectoral IVM committee or project steering committee at national level. All Project countries included stakeholders from a number of sectors into their steering committees, but other partners such as civil society and the private sector, were only included in Sudan.

National steering committees were re-constituted in several countries at the beginning of the Project. As noted in section 2.5.3, details on national steering committees, the outcomes of their meetings, and their effect on IVM implementation are still lacking.

Country ownership over Project activities has been created with activities on policy development, institutional arrangements, and capacity-building on IVM and pesticide management. Project countries have provided important co-funding resources for project implementation. One area in which country ownership has been only partly achieved is in the demonstration projects. The randomized controlled trials have involved a level of methodological and analytic complexity that demanded intensive involvement of expert consultants. The consultants played a major role in the design and data analysis of some studies, but this was carried out in consultation with the national counterparts, whereby project ownership remained with the countries themselves.

The STAC incorporated stakeholders from the Eastern Mediterranean Region Member States, UNEP, FAO, academia, WHO headquarters (Pesticide Evaluation Scheme; Department of Water, Sanitation, Hygiene and Health) and Regional Office for the Eastern Mediterranean. This selection of stakeholders appears to be in order, with the only comment that civil society representation has been lacking. As the results of demonstration projects are now being produced, and aspects of compliance and acceptance become instrumental to their adoption, it is **recommended** that a civil society organization (e.g. nongovernmental organization) from a hosting country is invited to the STAC meetings.

As discussed in section 6, communities are the Project's direct beneficiaries, and their compliance with and participation in vector control interventions is an important aspect that is being addressed by the Project but that does need reinforcement, as suggested.

7. CONCLUSIONS

The demonstration projects have made important progress in Sudan, Morocco, Islamic Republic of Iran and Yemen, with well-designed studies, successful rolling-out of interventions, sound systems of epidemiological and entomological surveillance in place in several countries, and promising preliminary data on cost-effectiveness. Foremost, the studies have demonstrated that it is possible to implement major research trials within a GEF-demonstration project in an operational context, bridging the gap between research and practice. Nevertheless, the mechanism used for critical review and competitive selection of the trials and their design has been questioned, which could be seen as a lesson learnt.

A major unforeseen risk has been the security situation in the Region, which has affected activities in Yemen and led to abandonment of the demonstration project in the Syrian Arab Republic.

A concern for long-term sustainability is the development of insecticide resistance, in view of the continued reliance on insecticidal vector control methods (mainly IRS and LLIN). It is unfortunate that non-chemical methods such as environmental management have not featured more prominently in some of the demonstration projects.

Advances have been reported in the development of policy and regulatory control, institutional arrangements and advocacy on IVM and/or pesticide management, with co-funding support. Less progress was reported in relation to training. The Project's role in developing the regional resolution and framework for action on managing the use of public health pesticides is commendable. IVM systems, with better surveillance and decision-making mechanisms, will be less likely to revert to DDT. A concern is that detailed documentation on activities and achievements under Component 2 is mostly lacking. As a consequence, it remains difficult to estimate the actual capacity for IVM implementation that has been developed since the baseline.

The Project has gone through a systematic process of selecting priority countries for disposal of POPs, carrying out capacity-building, inventories, and (in some countries) centralization and safeguarding of POP pesticides. These activities have clearly benefited from the expertise of FAO. The Project is well on its way towards disposal of 120 tonnes of POP pesticides and waste from Iran, Jordan and Morocco. It is unfortunate that the disposal costs are much higher than those estimated at the beginning, necessitating a major re-allocation of funds from other Project components to Component 3.

Regional coordination is in place but communication with, and response from, national project coordinators from several countries needs urgent strengthening. Also, documentation on the outcomes of national steering committee meetings should be improved. The STAC and its annual meetings have clearly contributed to the process of monitoring and evaluation, harmonization, coordination and inter-agency collaboration of Project activities at regional level.

Opportunities for replication of Project results have been created through adoption of a regional approach and through the situation analysis conducted at baseline. Some interventions used in the demonstration projects will be easier to replicate than other interventions. It has been suggested that randomized controlled trials are useful for

interventions with a wide application value, but that interventions with variable effects demand a more intuitive, adaptive management approach within the context of operational programmes.

8. RECOMMENDATIONS

A recap is given here of the recommendations described in the context of the respective sections of this report. A distinction is made between general recommendations and more specific recommendations.

8.1 General recommendations

1. This review suggested that the Project's balance between demonstration activities (Component 1) and IVM capacity-building (Component 2) needs re-adjustment. Current emphasis is primarily on demonstration of selected vector control interventions but much less on the capacity necessary to implement these interventions within an IVM strategy. In view of the observed sources of variation in local conditions (e.g. an increase in insecticide resistance; variable costs), an IVM strategy should embrace an adaptive management approach, in which the choice of interventions can be changed if the situation so dictates. Hence, it is recommended that the Project makes innovative advances in establishing, testing and documenting this adaptive management approach in an operational setting.
2. In view of the current emphasis on insecticidal interventions, demonstration projects should incorporate basic studies on vector ecology and environmental management, thus anticipating their relevance for future non-chemical tactics. This could include surveys of larval breeding habitats (including dry-season refugia), characterization of habitats, pupal productivity, and feasibility studies on the potential for environmental management.
3. Increased attention should be given in the demonstration projects to people's perceptions, acceptance and compliance with the introduced interventions. This requires additional sensitization and education. In particular, countries should explore opportunities for collaborating with agriculture on extension services or farmer field schools for the education of rural communities on IVM and pesticide management.
4. As exit strategy, all demonstration projects should actively engage local authorities in the projects and provide adequate guidance to ensure that positive results from the studies are correctly translated into methods and procedures for operations adapted to the local situation.
5. An updated strategy should be made for the best use of the remaining budget (27%), particularly its allocations for monitoring and evaluation, meetings, training courses, national seminars and reporting. The use of financial resources in the second term should ensure that the benefits of demonstration projects, IVM capacities, and information sharing are maximized, while taking into account the findings and recommendations of this mid-term review.
6. To improve the indicator for the Project's development objective, the Project should attempt to measure the likelihood of individual countries to revert to use of DDT in case of disease outbreaks, using the suggestions given in section 1.2.1. Such measure, once successfully developed and tested, would also benefit other DSSA projects.

8.2 Specific recommendations, by project component

8.2.1 Component 1

Specific recommendations regarding the implementation of demonstration projects in individual countries are as follows.

Islamic Republic of Iran

1. Data collection methods and experimental methods should be adjusted according to the revised outcome measures (larval density and community acceptability) as suggested by the STAC, if this is still possible at this advanced stage of the project.
2. In anticipation of positive study results, a plan should be prepared for up-scaling or marketing of the new intervention and dissemination of relevant information to local leaders and the general public, with identification of localities for replication.
3. The side effects (benefits, undesired effects) of the lids for water reservoirs should be explored and documented.
4. An illustrated case study should be prepared with lessons learnt for national and international use.

Morocco

5. An assessment of the reference treatment (environmental sanitation) and its possible changes during the project should be made.
6. If possible, differences in the costs of delivery of interventions between provinces should be presented.
7. Additional cost-effectiveness estimates could be obtained on the hypothetical use of DDT in IRS, on the assumption that the effectiveness is the same as for pyrethroids. Moreover, in sensitivity analysis, the potential effect of a long residual activity of DDT could be evaluated.
8. People's perceptions and compliance with the introduced interventions should be presented in the final results.

Sudan

9. Prioritize the quality of data collection related to effectiveness, through routine M&E with timely missions of consultants, if needed, to advise on corrective measures. If necessary, a timely request for extension of the study should be made so that additional resources can be secured.
10. In view of future efforts to promote environmental management (i.e. post-Project), the study team should describe larval breeding locations (including dry-season refugia), characterize habitats and determine pupal productivity.
11. Strengthen the socio-behavioural aspects of the study through IEC or COMBI campaigns, studying community perceptions about the interventions, and evaluating impact on people's behaviour with respect to treatment seeking, self-protection or vector control.

Syrian Arab Republic

12. Re-allocate the earmarked funds for demonstration activities in the Syrian Arab Republic to other Project activities.
13. The Syrian team should receive support in project formulation and application for new sources of funding in order to enable them re-start their demonstration project at a later date (i.e. after this Project).

Yemen

14. The demonstration project should pay increased attention to training, surveillance, monitoring and evaluation, and with IEC campaigns to educate communities about the need to comply with the interventions. The continued involvement of the international experts and exchange of expertise with Sudan, if possible through missions, will be instrumental to safeguard the quality of data on effectiveness. Inclusion of studies on the diurnal biting and resting behaviour of *Anopheles arabiensis* should also be considered.

8.2.2 Component 2

Specific recommendations regarding capacity-building on IVM are as follows.

1. If possible, the Project should continue to support the training of candidates from Project countries in response to the severe shortage of public health entomologists and vector control specialists in the Region.
2. As a follow-up of the regional MSc course, which was sponsored by the Project, it is important to study and document the (spill-over) effects, in terms of adaptation and use of curriculum in other countries, current position and role of trainees, entomological surveillance and decision-making.
3. It is recommended that countries provide feedback on whether the guidance documents on IVM, pesticide management and testing of insecticide resistance, which have been provided by the WHO Regional Office for the Eastern Mediterranean, need translation or adaptation according to country needs.
4. The development of case studies on IVM should be given due attention in view of its value for use in dissemination.
5. Descriptive details of achievements under Component 2 should be documented in the second half of the Project, if possible, with guidance provided by WHO. These details could also be used for the development of case studies.
6. Countries should revisit their comprehensive situation analysis at baseline (the VCNA) and determine how their achievements under Component 2 have addressed the gaps identified in the VCNA or, which shortcomings have not been adequately addressed. This assessment will assist in the final evaluation of the Project.
7. Training and human resources development on IVM ‘in the broad sense’ should be given increased attention in the second term, using WHO’s core structure for curriculum development on IVM.

8.2.3 Component 3

There are no specific recommendations regarding the collection, repackaging and disposal of POP pesticides. The under-estimation of costs for safeguarding and disposal should serve as a lesson learnt.

8.2.4 Component 4

Specific recommendations regarding information sharing on good practices and demonstrated alternatives for vector control are as follows.

1. Due to the timelines of demonstration studies, the substance of any planned scientific articles should be produced in report format before the end of the Project, so that it can be available for the final evaluation.
2. Details should be worked out regarding the roster of experts – how it will be used to benefit other countries, and how it will be managed beyond the end of the Project.
3. Project results should be shared at seminars and conferences with audiences within and outside of the Region, particularly with audiences that include policy-makers and programme managers.
4. A plan should be made for the development of dedicated web pages as a platform for dissemination of project outcomes, including a scheme on how the web pages will be managed and maintained beyond the end of the Project.
5. The WHO Regional Office for the Eastern Mediterranean and/or the STAC should prepare appropriate technical and operational guidance on how to adopt the results obtained in one country for the benefit of other countries with different eco-epidemiological and operational settings. This would enable replication of good practices on IVM strategies and pesticide management.

8.2.5 Component 5

Specific recommendations regarding coordination, monitoring and evaluation of Project activities are as follows.

1. The STAC should revisit the mechanism of communication between the regional level and national project coordinators, and reporting procedure, in order to suggest improvements where needed.
2. STAC meetings should be continued on an annual basis, and these meetings should pay increased attention to addressing Project Components 2 and 4. Project Component 2 in particular has benefited much less from consultant and expert services than Components 1 and 3, and thus it risks under-performance if not given more explicit consideration by the STAC. Upcoming STAC meetings should be planned in such a way that it enables field visits by participants to demonstration projects.
3. As the results of demonstration projects are now being produced, and aspects of compliance and acceptance become instrumental to the adoption of project outcomes, it is recommended that a civil society organization (e.g. nongovernmental organization) from a hosting country is invited to each STAC meeting.

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Annex 1. Documents consulted

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For additional documents consulted: See reference list

Annex 2. Project performance matrix

	OBJECTIVES	Indicators	Means of verification	Result at mid-term
1	The environmental objective is to reduce the negative effects of DDT in public health and the global environment through the introduction of sustainable, cost effective and environment friendly alternative interventions	Improved public health situation (by end PY5) for populations in the project demonstration areas due to stopped application of DDT in case of vector borne diseases outbreaks	Technical Reports from Public Health officers in the demo areas. Mid-term and Final Evaluation reports	Adverse health effects of vector control insecticide use are not being measured; impact of alternative interventions on disease prevalence is being measured in demo projects
2	The development objective is to reduce the reliance on DDT in case of outbreaks of vector borne diseases and to minimize the potential to revert to DDT use	Zero application of DDT (by the end of PY5) instead of an estimated potential 300 ton DDT use per year, and no stocks of DDT anymore available in the participating countries	Mid-term (PY3) and Final (PY5); Evaluation reports; Project Progress Reports, Final Report of obsolete stocks elimination	Zero application of DDT in Project countries at baseline and by mid-term; the actual risk that countries revert to DDT is not being measured (suggestions are given in this mid-term report)
	OUTCOMES	**Indicators**	**Means of verification**	**Result at mid-term**
1	Viability, availability, sustainability and cost effectiveness of the alternatives to the use of DDT demonstrated	Number of mortal vector borne diseases in the demonstration areas in the 8 participating countries has been significantly reduced while no DDT has been applied (PY5). None of the 8 countries request exemption for DDT use with the Secretariat of the Stockholm Convention (PY5)	Project steering committee reports; Technical reports and project; progress reports; Field surveys; Cost effectiveness report; Reporting from Stockholm Convention Secretariat	Demo projects are on track; preliminary results indicate promising results on cost effectiveness of interventions and other new data needed to guide future decision making on vector control
2	Capacity in each country to plan, implement and evaluate the application of alternatives to DDT based on the principles of IVM strengthened	8 countries with an IVM policy framework and IVM legal arrangements in place (PY5)	Project steering committee reports; Reports of national seminars; Policy and legal documents; National political endorsements of the policy and legal documents	Progress in IVM policy and legal arrangements has been reported in all countries, but follow-up and documentation on the functionality of these arrangements is needed
3	Collection, repackaging and disposal of POP pesticides used in public health and agriculture completed	Inventory of all POP pesticides in the 8 participating countries completed by PY3. Collection, repackaging and disposal of at least 100 tons POPs in 4 countries not covered under the Africa Stockpiles Program completed by PY5	Project steering committee reports; Inventory reports of 8 participating countries; Project progress reports; Reports of collection and disposal operation; Final disposal statement (certificate)	Updating of previous inventories completed; 120 t of POPs and waste collected and repackaged; tendering has lead to a contract for safeguarding and disposal
4	Information on good practices and demonstrated cost-effective and sustainable alternatives taken up by national institutions and planning processes	8 countries have accepted demonstrated alternatives in their national vector control policy and planning processes (PY5); Best practices for addressing IVM without the use of DDT and inter sectoral approaches mainstreamed in planning and development processes to allow wider introduction in other areas of the 8 countries (PY5)	Project steering committee reports; National policy documents; National work plans on IVM	Preliminary experiences and results have been documented and published for sharing with other countries
5	Transboundary & national coordination, information sharing and monitoring and evaluation mechanisms operational and effective in promoting Integrated Vector Management without the use of DDT	IVM programmes to reduce vector borne diseases without applying DDT being implemented and monitored by the 8 countries in the selected demo areas, reviewed by national (Steering Committees) and regional (STAC) structures and project activities widely shared and available. Regular budgetary allocations from governments to IVM practices in all 8 countries involved (PY5)	Project steering committee reports; Reports and decisions of district and national health policy and planning; mechanisms; National Steering Committee and STAC reports; Technical reports and Project; Progress reports; National and district financial accounts	Regional STAC and national steering committees established; STAC conducting M&E of project activities with annual reviews; Project coordination in place; communication with countries needs strengthening

OUTPUTS		Indicators	Means of verification	Result at mid-term
1.1	A protocol formulated by the National Steering Committee, following guidance from the WHO Regional Office with on-site review by an international expert completed for each participating country.	8 protocols completed (PY2) and mechanisms in place for their implementation in demo areas (by PY5)	Completed country protocols	Protocols have been completed timely, with adequate technical support, and those of selected countries were implemented
1.2	Specific capacity building carried out that may be required for successful implementation of the protocol, based on the needs identified in the demonstration project proposal.	Number of cases from 8 countries whose request for specific capacity building has been adequately dealt with	Project progress reports; Reports on demonstration project specific; capacity building activities; Workshop notes	Regional training workshop on cost-effectiveness measurement completed
1.3	Regional workshop conducted for the harmonization of the country protocols with effective follow-up for the completion of the protocols, and final review by the STAC	16 demo projects successfully implemented by PY5. 1 Regional harmonisation workshop conducted (PY2)	Project progress reports; Workshop report	Harmonization has been achieved during the 2nd STAC meeting in 2009
1.4	Assistance provided to the National Project Coordinators for essential elements of demonstration project implementation in line with the agreed protocols	Number of monitoring procedures carried out correctly as planned. Number of final reports produced (PY1-5); 16 demonstration projects with significantly reduced vector borne disease outbreaks (while no DDT was applied) successfully completed by PY5 without significant loss of ecosystem functioning and loss of biodiversity values; Attitude change by involved communities	Harmonized protocols; Project progress reports; Socio-economic data evaluation at various points during project life time	On-site technical support on new tools provided in Iran, Morocco, Sudan and Syria, but not in Yemen
1.5	Project activities monitored through screening of annual reports by the National Steering Committee and STAC and by on-site visits to demonstration projects by STAC members, and dissemination of observations and recommendations	Number of regional analysis carried out correctly as planned. Number of final reports produced (PY1- 5)	Technical, management and financial progress reports; Reports on technical and managerial support activities; Final Technical, management and financial reports; Bi-annual project reports; annual reports of the National Project coordinator; review reports by the STAC; reports on site visits by STAC members	The STAC met annually to review progress; submission of annual reports by countries needs improving; STAC members made visits to demonstration projects in Morocco, Sudan and Iran; STAC made recommendations which were adequately implemented
1.6.1	Technical support (through consultancies) provided for the analysis of datasets, including cost-effectiveness and sustainability analysis, and the production of the final report	Consultancy reports and Final Report made available to STAC (PY3-5)	Project progress reports; Consultancy reports	On-site technical support on data analysis provided in Iran, Morocco and Sudan. The security situation prevented visits to Syria and Yemen
1.6.2	STAC meeting held to review the national reports and draft the consolidated regional report, including lessons learnt, for submission to relevant parties.	Consolidated regional report produced in accordance with STAC terms of reference (PY5)	Project progress reports; Report of STAC meeting	Final STAC meeting planned for 2014
2.1	National seminars organized for the review of policy and legal frameworks	8 sets of inter-sectoral policy and legal frameworks seminars organised (PY2-5); Number of countries with an IVM policy framework and IVM legal arrangements in place	Reports of seminars including suggestions for changes for policy and legal documents; national political endorsements of the new/adapted policy and legal documents; project progress reports	Completed, but not yet adequately documented
2.2.1	Promotional documents produced, country visits conducted and national seminars organised, provision of examples and case studies of successful institutional arrangements between the sectors completed	Number of community-based IVM activities initiated in each country at PY5	Advocacy materials for intersectoral collaboration and community involvement, educational & training material produced (technical and advocacy leaflets, maps, etc.); Training reports; Project progress and technical reports; Agreements (MoU, performance contracts) between different ministries	On track, with assistance from WHO, but not yet adequately documented

OUTPUTS		Indicators	Means of verification	Result at mid-term
2.2.2	Existing local health services, agricultural extension services and farmer field schools are used to channel messages on IVM and the sound management of pesticides to rural communities	8 countries have a restructured vector control unit operating on the basis of IVM including participation of all relevant partners (PY5)	Project progress reports; Materials for use by community, health services, agricultural extension services and/or farmer field schools	This activity is still pending
2.3	National vector control units are restructured to ensure that all essential IVM functions are performed well at all levels. Technical cooperation in the area of program management provided as needed	8 Vector Control Units in the participating countries are restructured (PY4) and full technical cooperation is provided as needed (PY5)	Action plans for restructuring the vector control units; Progress reports on the restructuring processes in each participating country; Organograms of the new vector control units; Project progress reports	7 out of 8 Project countries have restructured their vector control unit, with support from WHO and the STAC. Documented information on the functioning of vector control units is still largely lacking. Restructuring in 1 country is obstructed by problems with technical capacity
2.4	Guidelines and training materials for vector control professionals are developed, updated and reviewed	Number of updated, reviewed and developed guidelines and training materials available for vector control professionals in the region	Available guidelines and training materials	Some progress in developing guidelines and training materials on IVM; case studies have not yet been developed; training courses on IVM are still pending; several other training courses have taken place in countries
3.1	Obsolete POP pesticides used in public health and agriculture are collected, repacked and disposed	Inventory of all POP pesticides in the 8 participating countries completed by PY3. Collection, repackaging and disposal of at least 100 tons POP pesticides from 4 countries not covered under the Africa Stockpiles Program completed by PY5	Training reports concerning inventory training; Inventory reports of 8 participating countries; Project progress reports; Reports of collection and disposal operation; Final disposal statement (certificate)	Updating of inventories completed in Iran and Jordan; disposal of 120 t of POPs and waste from 3 priority countries is on track (tender contract expected to be issued soon)
4.1	Report and/or article for peer reviewed literature is published, trilingual web page is designed and publicly available to give wide dissemination to the outcomes of the national studies	Web pages in English, French and Arab created (by PY3) and at least two scientific publications (at least one in each language English, French or Arab) produced and published in relevant science periodical (PY5)	Web pages; Relevant scientific periodical; Project progress reports	Articles reviewing achievements have been published; several technical articles are anticipated; Regional expert roster initiated; web pages are still pending
5.1	(Part-time) Project Coordinator assigned by WHO, Assistant Technical Project Coordinator recruited and eight National Project Coordinators assigned; transboundary & national coordination, information sharing, monitoring and evaluation assured	Confirmation of WHO provision of a suitable Project Coordinator (PY1). Timely recruitment and proper working of Assistant Project Coordinator (PY1) and eight National Project coordinators (PY1)	National and Project Reports; Contracts project staff	Coordinator, Secretary and Asst. Techn. Coordinator made available by WHO; 8 national coordinators assigned; communication with, and response from, national coordinators has been poor and therefore, communication needs strengthening
5.2	Establishment/functioning of a National Steering Committee in each participating country	National Steering Committees in each participating country guide national processes and meet once/twice yearly (PY1-5)	Steering Committee meeting reports; National and Project Reports	National Steering Committees exist but documented information on their functioning is largely lacking
5.3	Establishment/functioning of a Regional Scientific and Technical Advisory Committee	STAC members appointed by the Regional Director of WHO according to the related Terms of Reference (Annex N) and STAC meeting once/twice a year (PY1-5). Minutes of STAC meetings	Written confirmation from the Regional WHO Director; STAC Meeting reports, Project Progress Reports	STAC meetings conducted and reports produced annually; benefits of the STAC have become manifest; expertise of STAC members should be better utilized by countries

Annex 3. Project progress reported by WHO

No.	Outputs and activities	Expected compl. date	Implementation status Jun-11 (%)	Comments
1.1	**Output 1: Draft national protocols for demonstration activities formulated**	Jun-09	100%	
1.1.1	Activity 1: Organize a multi-stakeholders meeting (including academia) to develop a draft protocol to be reviewed by the national steering committee for consensus before submission to WHO	Mar-09	100%	
1.1.2	Activity 2: Assign experts to provide on-site country visits	Jan-09	100%	
1.2	**Output 2: Project-specific capacity building for successful implementation of proposed demonstration studies conducted**	Sep-09	100%	
1.2.1	Activity 1: Identify project-specific training needs (surveillance training, species identification (sand fly), insecticide resistance monitoring, planning operations, application, community advocacy)	Mar-09	100%	
1.2.2	Activity 2: Identify experts to provide the training	Jun-09	100%	
1.2.3	Activity 3: Conduct project-specific training in countries	Sep-09	100%	
1.3	**Output 3: A regional workshop for the harmonization of country protocols organized**	Jun-09	100%	
1.3.1	Activity 1: Conduct a Regional workshop for the harmonization of country protocols (invite neighboring countries)	Jun-09	100%	
1.3.2	Activity 2: Produce a harmonized template for reporting mechanisms and format of results	Jun-09	100%	
1.4	**Output 4: National Project Coordinators assisted in project implementation**	Dec-13	On track (40%)	
	Output 4: National Project Coordinators assisted in project implementation	Dec-13	On track (40%)	
1.4.1	Activity 1: Provide technical and managerial support to countries for implementation of demonstration activities	Dec-13	On track (40%)	
1.4.2	Activity 2: Countries to provide requests for specific supplies needed for project implementation	Sep-09	100%	
1.4.3	Activity 3: On-site visits by experts on specific areas such as cost-effectiveness analysis	Dec-13	On track (20%)	4 countries had their first visit between Jan-Jun 2011
1.5	**Output 5: Project demonstration activities monitored**	Mar-14	On track (10%)	
1.5.1	Activity 1: Establish baseline data on agreed set of indicators	Jun-10	On track (100%)	

No.	Outputs and activities	Expected compl. date	Implementation status Jun-11 (%)	Comments
1.5.2	Activity 2: Monitor project activities	Dec-13	On track (30 %)	This is an average taking into account that the progress varies from country to country. For example the Islamic Republic of Iran and Yemen have not started implementation yet.
1.5.3	Activity 3: Conduct country on-site visits	Dec-13	On track (20%)	
1.5.4	Activity 4: Analyze data sets	Mar-14	On track (5%)	
1.5.5	Activity 5: Produce and disseminate reports	Mar-14	On track (5%)	
1.6	**Output 6: Technical support for the analysis of datasets and report writing provided**	Jun-14	On track	
1.6.1	Activity 1: Develop a practical guiding document/tool on cost-effectiveness analysis (relative cost)	Jun-09	80%	Yemen remaining because of current turmoil
1.6.2	Activity 2: Conduct a workshop to review, finalize and field-test the tool	Jun-09	100%	
1.6.3	Activity 3: Train national vector control managers on how to use the cost-effectiveness tool	Dec-09	100%	
1.6.4	Activity 4: Provide technical support for cost-effectiveness analysis	Mar-14	On track (20%)	
1.6.5	Activity 5: Provide technical support for the preparation of final reports	Jun-14	On track (10%)	
1.7	**Output 7: Regional STAC Meetings and consolidated regional reports organized**	Dec-14	On track (10%)	
1.7.1	Activity 1: Organize Regional STAC meeting to review national reports	Dec-14	On track (60%)	
1.7.2	Activity 2: Provide a consolidated report by STAC	Dec-14	On track	
2.1	**Output 8: National seminars for the review of policy and legal frameworks organized**	Dec-09	On track (100%)	
2.1.1	Activity 1: Organize high level meetings to raise awareness and support for IVM and pesticide management policy and regulations	Dec-09	100%	
2.1.2	Activity 2: Develop draft national plans on policy, legal and regulatory frameworks for IVM and pesticide management	Jun-09	100%	
2.1.3	Activity 3: Provide consultants to harmonize the draft national action plan for implementation of principles of IVM and sound management of pesticides	Dec-09	100%	
2.1.4	Activity 4: Conduct national stakeholder meeting to review the national action plan and to build consensus for its implementation	Dec-09	100%	

No.	Outputs and activities	Expected compl. date	Implementation status Jun-11 (%)	Comments
2.1.5	Activity 5: Provide additional technical support for implementation of the national action plan e.g. support capacity for quality control facilities	Dec-09	100%	
2.2	**Output 9: Promotional documents produced, country visits conducted and national seminars organized for successful institutional arrangements**	Dec-14	On track (40%)	
2.2.1	Activity 1: Develop and produce relevant promotional documents – including translation and distribution of existing documents (e.g. IVM position statements)	Dec-14	On track (50%)	Note: Poster, brochure, and bookmarks produced in various key languages for the region
2.2.2	Activity 2: Support countries to adapt available promotional documents	Dec-10	-80%	
2.2.3	Activity 3: Demonstrate successful case studies of institutional arrangements	Dec-14	On track (5%)	
2.2.4	Activity 4: Organize national seminars on strengthening institutional arrangements between sectors	Dec-09	100%	
2.3	**Output 10: National vector control units are restructured to ensure that all essential IVM functions are performed well at all levels**	Dec-10	90%	**7 countries have almost achieved 100% of restructuring. One country still struggling due to lack of strong national capacity**
2.3.1	Activity 1: Write to MOH to inform them of the outcome of VCNA	Jun-09	100%	
2.3.2	Activity 2: National Steering Committee initiates restructuring process at country level	Dec-09	90%	As above
2.3.3	Activity 3: Develop vision and mission statements of vector control units	Dec-09	60%	
2.3.4	Activity 4: Develop terms of reference and descriptions of staff posts and responsibilities	Dec-09	60%	
2.3.5	Activity 5: Strengthen existing vector control units and advocate for additional human and financial resources	Dec-10	40% and on track	
2.3.6	Activity 6: Develop a concept paper on restructuring vector control units for adaptation by countries on their specific needs	Jun-09	100%	Published
2.3.7	Activity 7: Provide technical support/cooperation by Regional Office and STAC	Dec-10	100%	
2.4	**Output 11: Guidelines and training materials for vector control professionals are developed, updated and reviewed**	Dec-14	40%	
2.4.1	Activity 1: Develop, update and/or review guidelines and training materials on IVM, insecticide application, safety, monitoring insecticide resistance etc.	Dec-13	40%	
2.4.2	Activity 2: Generate relevant case studies	Dec-14	On track (5%)	
2.4.3	Activity 3: Organize regional workshops and training courses – including training of community leaders on IVM implementation	Mar-10	0%	

No.	Outputs and activities	Expected compl. date	Implementation status Jun-11 (%)	Comments
3.1	**Output 12: Obsolete POP pesticides used in public health and agriculture are collected, repacked and disposed**	Dec-14	20% - On track	Implementation of this activity is being fast-tracked to be completed by end of 2012
3.1.1	Activity 1: Carry out a stakeholder analysis on organizations involved in POPs	Sep-09	100%	
3.1.2	Activity 2: Train personnel in safe handling of obsolete POPs	Jun-10	100%	
3.1.3	Activity 3: Undertake and update inventories on obsolete POPs	Mar-10	100%	
3.1.4	Activity 4: Compile, prioritize and analyze inventory data on obsolete POPs	Sep-10	80%	
3.1.5	Activity 5: Procure equipment and services to safeguard obsolete POPs	Mar-12	30%	
3.1.6	Activity 6: Repackage and centralize obsolete stocks of obsolete POPs	Dec-13	30%	
3.1.7	Activity 7: Securely store repackaged obsolete stocks of obsolete POPs	Dec-14	0%	
4.1	**Output 13: Web pages in English, French and Arab created and at least two scientific publications published in relevant science periodicals**	Dec-14	On track (10%)	
4.1.1	Activity 1: Publish two articles in peer-reviewed journals on best practices	Dec-14	On track (50%)	One article has been published in the Eastern Mediterranean Health Journal and another submitted and will be published in the October issue
4.1.2	Activity 2: Translate reports on demonstration of alternatives	Dec-14	On track (0%)	
4.1.3	Activity 3: Establish a roster of experts from the project countries	Dec-14	On track (40%)	
4.1.4	Activity 4: Create dedicated web-pages to avail information through internet at Regional Office and linked to appropriate country links	Dec-14	On track (20%)	
4.1.5	Activity 5: Use information collected to mobilize additional resources for project implementation and sustainability	Dec-14	On track (10%)	
5.1	**Output 14: Trans-boundary and national Coordination, information shared, monitored and evaluated**	Dec-14	On track (20%)	
5.1.1	Activity 1: Coordinate timely and efficiently proposed project activities	Dec-14	20%	
5.1.2	Activity 2: Share information on the outcome of the implementation of the proposed project –especially with bordering countries	Dec-14	On track (20%)	
5.1.3	Activity 3: Institutionalize border coordination as part of information sharing	Dec-14	20%	
5.1.4	Activity 4: Conduct ongoing monitoring and evaluation of the proposed project activities	Dec-14	On track (20%)	

No.	Outputs and activities	Expected compl. date	Implementation status Jun-11 (%)	Comments
6.1	**Output 15: Project Coordinator assigned by WHO and eight National Coordinators assigned**	Mar-09	100%	
6.1.1	Activity 1: Appoint a full-time Project Coordinator	Mar-09	100%	
6.1.2	Activity 2: Recruit and appoint a full-time Assistant Technical Project Coordinator	Jun-09	100%	The post was filled with a secondee from the Government of Sudan as per STAC 2 recommendations.
6.1.3	Activity 3: Appoint a full-time Programme Assistant (Secretary)	Mar-09	100%	
6.1.4	Activity 4: Assign 8 national project coordinators	Jun-09	100%	
-	Activity 5: Support project staff	Dec-09	100%	
5.2	**Output 16: National Steering committee in each participating country established and operating**	Dec-14	40% - on track	
5.2.1	Activity 1: Reconstitute where applicable the composition of the National Steering Committees	Dec-09	100%	
5.2.2	Activity 2: Conduct meetings of National Steering Committees twice a year	Dec-09	100%	
5.2.3	Activity 3: Support National Steering Committees to prepare and produce national reports	Dec-14	20% - On track	
5.3	**Output 17: A Regional Scientific and Technical Advisory Committee (STAC) established**	Dec-14	60%	
5.3.1	Activity 1: Conduct meeting of the Regional Scientific and Technical Advisory Committee (STAC) twice a year	Dec-09	100%	Because of cost of these meetings, it was agreed during the 2nd STAC that this will be held once a year
5.3.2	Activity 2: Support the Regional Scientific and Technical Advisory Committee (STAC) to prepare and produce reports using the developed reporting template	Dec-14	20% - On track	
6.2	**Output 18: Mid-Term and Final Evaluations of Project conducted**	Dec-14	On track (0%)	
6.2.1	Activity 1: Conduct mid-term evaluation of project by executing agency (WHO)	Jun-11	100%	
6.2.2	Activity 2: Conduct terminal independent project evaluation by UNEP on behalf of GEF	Dec-14	On track (0%)	
-	**Output 19: Programme support cost to WHO provided**	Dec-14	On track – 40%	
-	Activity 1: Provide 10% Programme support cost to WHO	Dec-14	On track - 20% of first, second and third fund installments provided to WHO	

Annex 4. Project finances

A. Actual and projected expenditures by year

UNEP budget line/Object of expenditure		2009 Actual	2010 Actual	2011 Actual	2012 Actual	2013 Projected	2014 Projected	TOTAL
1 Project personnel								
1101	Project Coordinator P05	–	–	–	–	–	–	–
1102	Assistant Administrator CR5	–	–	–	–	–	–	–
1103	Asst. Techn. Project Coordinator P03	25 000	(25 000)	–	–	–	–	–
1199	**Project personnel**	**25 000**	**(25 000)**	–	–	–	–	–
1201	Analyse datasets, cost-effectiveness & sustainability	–	–	–	24 928	15 000	8072	48 000
1202	Produce advocacy and promotional materials on IVM	–	–	–	–	–	–	–
1203	Review policy and legal frameworks on IVM	–	–	–	45 929	7000	6251	59 180
1204	Develop guidelines capacity building in vector control	11 699	350 000	1749	(332 628)	–	–	30 820
1205	Collect, repackage and dispose obsolete POPs	–	–	–	686 000	–	–	686 000
1299	**Consultants**	**11 699**	**350 000**	**1749**	**424 229**	**22 000**	**14 323**	**824 000**
1601	Monitor and evaluate project by Regional Office staff	12 392	20 000	11 912	5430	25 266	25 000	100 000
1699	**Travel on official business**	**12 392**	**20 000**	**11 912**	**5430**	**25 266**	**25 000**	**100 000**
1999	**Component Total**	**49 091**	**345 000**	**13 661**	**429 659**	**47 266**	**39 323**	**924 000**
2 Sub-contracts		–	–	–	–	–	–	–
2101	WHO	45 455	140 409	–	56 204	82 600	35 334	360 002
2199	**UN agencies**	**45 455**	**140 409**	–	**56 204**	**82 600**	**35 334**	**360 002**
2201	Implement demonstration activities in countries	11 440	540 706	122 678	241 909	277 972	91 702	1 286 407
2202	Formulate nat'l protocols for demonstration activities	–	–	36 039	11 658	–	–	47 697
2203	Carry out and update inventories on POPs	–	50 000	–	–	–	–	50 000
2204	Support National Project Coordinators	–	–	–	–	–	–	–
2205	Independent MT and End Evaluations	–	–	–	–	–	–	–
2299	**Non-profit organizations**	**11 440**	**590 706**	**158 717**	**253 567**	**277 972**	**91 702**	**1 384 104**
2399	Commercial purposes	–	–	–	–	–	–	–
2999	**Component Total**	**56 895**	**731 115**	**158 717**	**309 771**	**360 572**	**127 036**	**1 744 106**
3 Training		–	–	–	–	–	–	–
3199	**Fellowships**	–	–	–	–	–	–	–
3201	Support re-structuring of vector control units in MOH	–	46 241	17 504	(26 930)	19 185	9000	65 000
3202	Conduct training on country project protocols	–	41 326	30 447	(25 169)	–	–	46 604
3203	Conduct training courses on vector control	27 743	74 830	80 000	95 575	70 000	62 966	411 114
3204	Conduct national seminars on IVM advocacy	–	50 000	–	(5757)	40 000	26 000	110 243
3299	**Group training**	**27 743**	**212 397**	**127 951**	**37 719**	**129 185**	**97 966**	**632 961**
3301	Regional w/shop to harmonize national protocols	53 430	–	1871	18 219	–	–	73 520
3302	STAC meeting to review national reports	–	–	47 747	34 728	–	–	82 475
3303	Support Regional STAC	–	–	58 212	63 119	60 000	60 000	241 331
3304	Support National Steering Committees	–	–	–	2507	–	–	2507

3399	**Meetings/conferences**	**53 430**	**–**	**107 830**	**118 573**	**60 000**	**60 000**	**399 833**
3999	**Component Total**	**81 173**	**212 397**	**235 781**	**156 292**	**189 185**	**157 966**	**1 032 794**
4 Equipment & premises		–	–	–	–	–	–	–
4199	**Expendable equipment**	–	–	–	–	–	–	–
4299	**Non-expendable equipment**	–	–	42 085	–	–	–	**42 085**
4399	**Premises**	–	–	–	–	–	–	–
4999	**Component Total**	–	–	**42 085**	–	–	–	**42 085**
5 Miscellaneous		–	–	–	–	–	–	–
5199	**Operation and maintenance**	–	–	–	–	–	–	–
5201	Production of advocacy materials for IVM	4657	42 205	420	(6409)	–	–	40 873
5202	Production of STAC reports	–	–	–	–	–	–	–
5203	Publish project report and a web page	–	–	–	1960	15 000	14 000	30 960
5299	**Reporting costs**	**4657**	**42 205**	**420**	**(4449)**	**15 000**	**14 000**	**71 833**
5399	**Sundry**	–	–	–	–	–	–	–
5499	**Hospitality and entertainment**	–	–	–	–	–	–	–
5500	Cash disbursements	–	700 000	(700 000)	–	–	–	–
5501	Mid-Term Evaluation	–	–	–	–	25 000	–	25 000
5503	Monitor and evaluate project demonstration activities	–	–	–	17 930	24 070	18 000	60 000
5599	**Evaluation**	–	**700 000**	**(700 000)**	**17 930**	**49 070**	**18 000**	**85 000**
5999	**Component Total**	**4657**	**742 205**	**(699 580)**	**13 481**	**64 070**	**32 000**	**156 833**
UNEP participation costs								
5581	Terminal Evaluation	–	–	–	–	–	60 196	60 196
Grand total		**191 816**	**2 030 717**	**(249 336)**	**909 203**	**661 093**	**416 521**	**3 960 014**

B. Project financing by GEF, Governments and WHO

No.	Activities	Governments	WHO	GEF
Component 1				
1.1	Formulation of national protocols	7000	28 000	59 000
1.2	Capacity building for project implementation based on country protocol	70 000	28 000	59 000
1.3	Organize a regional workshop for harmonization of country protocols	7000	–	48 880
1.4	Demo project implementation	5 681 770	50 000	1 339 600
1.5	Monitor project activities and on-site visits to demonstration projects	35 000	28 000	308 600
1.6	Analysis of data sets, including cost effectiveness and sustainability	35 000	37 000	48 000
1.7	Regional STAC Meetings and consolidated regional reports organized	–	14 000	42 600
	Sub-total	**5 835 770**	**185 000**	**1 905 680**
Component 2				
2.1	Review of policy and legal frameworks	112 000	37 000	176 000
2.2	Produce advocacy and promotional documents and conduct country visits conduct national seminars on on site visits	64 000	–	160 000
2.3	Restructuring of national vector control units	40 000	–	160 000
2.4	Developing guidelines and organization of training courses on vector	112 000	–	450 000
	Sub-total	**328 000**	**37 000**	**946 000**
Component 3				
3.1	Collection, repackaging and disposal of obsolete POP pesticides ...	215 132	–	400 000
	Sub-total	**215 132**	–	**400 000**
Component 4				
4.1	Publication of project reports and formation of web page	80 000	9333	166 500
	Sub-total	**80 000**	**9333**	**166 500**
Component 5				
5.1	National and trans-boundary coordination, information sharing and	80 000	120 000	–
5.2	Operating of 8 national steering committees	80 000	246 667	40 000
5.3	Operating of Regional STAC, production of various reports	–	–	131 000
	Sub-total	**160 000**	**366 667**	**171 000**
Component 6				
6.1	Recruitment of 1 Asst. Techn. Project Coordinator and assignments	592 000	225 000	–
6.2	100% Project coordinator and office support	–	382 500	17 500
	Sub-total	**592 000**	**607 500**	**17 500**
Independent project evaluation				60 000
WHO programme support costs (8%)				293 334
GRAND TOTAL		**7 210 902**	**1 205 500**	**3 960 014**

Annex 5. Rating of Project success

Criterion	Rating*	Comments
Achievement of objectives and planned results	S	Zero-use of DDT in Project countries, with no indication that this will change
Attainment of outputs and activities	HS	This rating is given in recognition of the number and quality of outputs and activities by mid-term
Cost effectiveness	HS	High incremental cost-effectiveness is expected in view of the Project's investment in capacity building on DDT alternatives and IVM strategies
Impact	HS	Good prospects for long-term impact in terms of transition away from DDT towards an IVM system in countries
Sustainability	S	Promising results achieved at mid-term in policy and legal change but uncertainty remains about implementation of IVM at all levels
Stakeholder participation	S	Strong engagement of institutional stakeholders at national, Regional and international level, but community participation needs reinforcement
Country ownership	S	Strong national ownership over transition process on IVM, but demonstration projects remain partly dependent on external technical support
Implementation approach	S	Good organizational structure, especially regarding implementation of Project Components 1 and 3, but engagement of national entities needs strengthening in some countries
Financial planning	S	Adequate and timely adjustments in allocation made in response to changing situations in countries
Replicability	S	Results and experiences can be of much benefit across the Region, if documented; however, replication will need adaptation with adequate guidance
Monitoring and evaluation	MS	Rating in view of limited communication with and response from country coordinators, despite adequate mechanisms being in place

*HS, highly satisfactory; S, satisfactory; MD, moderately satisfactory; US, unsatisfactory; HU, highly unsatisfactory

Annex 6. Scientific and Technical Advisory Committee

a) Terms of Reference

Following are the Terms of Reference for the members of the Scientific and Technical Advisory Committee of the project *Demonstration of Sustainable Alternativesto DDT and Strengthening of National Vector Control Capabilities in the Middle East and North Africa*:

- To review and comment on the national work plans and the harmonized protocols for the national demonstration projects for their relevance to the project objectives, their feasibility and technical soundness, and their completeness in addressing all elements required by the project.
- To give advice on all aspects of capacity-building in the context of the project.
- To carry out an annual review of the progress reports of the demonstration projects, submitted by the National Coordinators, and to advise on scientific, technical and managerial aspects for the strengthening of the projects.
- To give advice on all challenges, constraints and problems encountered in the implementation of the national work plans including the implementation of the national demonstration project.
- To review the final reports of the demonstration projects and support the preparation of a consolidated regional report.
- To advise on ways and means to ensure that specific cross-cutting issues (cost-effectiveness analysis, sustainability) receive adequate attention in all relevant project activities.
- To advise on the mechanisms for inter-agency coordination and coordination between different sectors at the national level (including communities) in support of the implementation of the project.
- To advise the WHO Regional Office, based on the national and regional experiences, about the steps needed to sustain the project's gains in the eight participating countries and to expand these gains to other countries in the Region.

b) Criteria for the selection of STAC members

Areas of expertise and technical background: The following areas of expertise must be represented in the STAC: vector control, epidemiology, environmental health and health economics. As IVM is at the core of the project, vector control will be represented by two experts on the STAC. All members of the STAC should have a broad public health background. In addition to the above areas of expertise, the following disciplines are specifically listed as they are expected to be acquired through co-opting STAC members for one or more meetings: social science, agricultural science and ecology. This does not exclude experts from other disciplines to be co-opted as the need arises.

Experience: Members of the STAC must have at least 15 years of experience in their area of expertise. They must have field experience in the region. They must have a sound academic

background, with a post graduate degree in the area of expertise. It is an asset to have served on WHO or other UN Expert Panels.

Skills: Fluency in English

c) Modus operandi

The STAC will be composed of five core members, designated for the entire period of the project by the Regional Director of WHO EMRO. The Chair will be appointed by the Regional Director. The STAC has the possibility to co-opt members to address specific issues for which it feels attracting additional expertise is warranted.

Representing the Implementing Agency, a UNEP/GEF staff member will be a member of the STAC in order to monitor achievement of the incremental benefits of the project. Representatives of other UN sister organizations will be invited to the STAC meetings. The official language for STAC meeting will be English. The costs incurred by STAC activities will be covered from the project budget.

Annex 7. National Steering Committees

During the PDF-B phase, National Steering Committees were formed in each participating country under the leadership of the MOH (National Project Focal Point) to oversee PDF activities at the national level. The project document for the PDF-B stated that the committee, which may have a maximum of seven members, will be made up of representatives from ministries of health, environment, agriculture as well as other major stakeholders in the private and public sectors in the country. The national steering committee will meet as often as deemed necessary by the National Project Focal Point, and will provide necessary feed back to the regional process, such as Project Steering Committee and the regional workshops. Coordination of the national project steering committee with the NIPs committee is essential to assure integration of the project activities into the NIPs on POPs. Therefore a representative (preferably the National Focal Point on POPS) will be a core-member of the National project steering committee.

The terms of reference were specified as follows:

1. Review and endorse the national VCNA reports
2. Review and endorse the national strategic plan of IVM(IVM);
3. Agree on the proposed draft plan for the full project proposal under GEF support
4. Review and endorse the selection of the demonstration sites

The same terms of reference were applied to the Full Size Project phase.

Annex 8. Details of missions

Country	Mission dates	Mission objectives	Persons
Djibouti	21-28 Mar 2009	Support the MOH in finalizing the national plan of action and protocol for demonstration project	Dr Mnzava (project coordinator)
	Unknown dates	Review implementation in 2011; support the development of implementation plan for 2012; advice on priority action to strengthen the capacity of the programme for implementation of vector control programme for malaria and other vector borne diseases	WHO Regional Adviser; Dr Ameur (consultant)
	Apr 2012 - present	Continuous assistance to MOH in implementation of project activities, under Special Service Agreement	WHO Technical Officer
Egypt	1 Mar - 31 Jul 2012	Continuous assistance to MOH in implementation of project activities, under APW	Dr A-B. Zayed (consultant)
Islamic Republic of Iran	Early Jun 2010	Facilitation of a NTC on vector susceptibility to pesticides and IVM principles	Dr Mnzava (project coordinator)
	20-28 Nov 2010	Provide support to finalize national protocol for demonstration activities	Dr Kleinschmidt (consultant)
	19 Jun - 7 Jul 2011	Undertake an inventory of the obsolete DDT and associated wastes; and prepare an outline specification for safeguarding and disposal	Mr Byrde (FAO consultant)
	26 Jun- 2 Jul 2011	Support implementation of project activities	Dr Mnzava (project coordinator); Dr Yukich
Jordan	4-9 Jun 2011	Undertake an inventory of the obsolete DDT and associated wastes; conduct training on safeguarding and inventory methods; and prepare an outline specification for safeguarding and disposal	Mr Byrde (FAO consultant)
	22-28 Oct 2011	Facilitation of a NTC on vector susceptibility to pesticides and IVM principles	Dr A-B. Zayed (consultant)
	1-13 Sep 2012	Facilitation of national training course on pesticide management	Dr T. Al-Antary (consultant)
Morocco	2-4 Sep 2009	Support vector control program in designing the protocol for the demonstration study on Leishmaniasis control	Dr Kleinschmidt (consultant)
	17-21 Jan 2011	Evaluation of cost-effectiveness of the first year of the demonstration study	Dr Elkhalifa (techn. coordinator); Dr Yukich
	12 Jul 2011 (in conjunction with STAC Meeting)	Undertake an inventory of obsolete DDT and associated wastes; and prepare an outline specification for safeguarding and disposal	Dr Thompson (FAO expert)
	12-17 May 2012	Analysis of data related on cost effectiveness on DDT alternatives, and preparation of a preliminary report	Dr Elkhalifa (techn. coordinator); Dr Yukich
Sudan	16-26 May 2009	Preparation of proposal for demonstration study, including field visits to four study areas	Dr Kleinschmidt (consultant)
	11-17 Apr 2011	Training of study team to set tools of cost effectiveness analysis and methods for data collection	Dr Elkhalifa (techn. coordinator); Dr Yukich (consultant)
	20-25 May 2011	Review of progress including field visit to three study areras (El-Hoosh, Hagabdalla and Galabat) and visit to Sennar molecular laboratory	Dr Mnzava (project coordinator)
	19-24 May 2012	Analysis of data collected from study areas for cost-effectiveness analysis	Dr Elkhalifa (techn. coordinator); Dr Yukich (consultant)
	11-21 Oct 2012	Support implementation of demonstration study; conduct preliminary analysis of data	Dr Kleinschmidt (consultant)
Syrian Arab Republic	8-14 Aug 2009	Support the MOH to finalize the project proposal for the demonstration project	Dr Mnzava (project coordinator)
	25 Oct - 1 Nov 2010	Review the malaria control programme and the GEF project	Dr Atta (WHO Reg. Advisor); Dr Mnzava (project coordinator)
Yemen	23 Jan - 1 Feb 2011	Field assessment of the proposed demonstration project area and support NMCP in designing the protocol for the demonstration study on DDT alternatives for malaria control	Dr Mnzava (project coordinator)

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