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**Federal Ministry of Agriculture and Water  
Resources (FMAWR)**

**PROJECTS COORDINATING UNIT (PCU) OF THE FEDERAL  
MINISTRY OF AGRICULTURE AND WATER RESOURCES**

**PEST MANAGEMENT PLAN (PMP)**

**FOR THE**

**FADAMA III PROJECT**

**- Final Report -**

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## **INTRODUCTION**

This pest management plan has been prepared as part of the ESMF in the context of the Fadama III project. This is an agricultural and rural development project supported by The World Bank and based on the Community-Driven Development (CDD) approach strategy, explicitly supported by the Country Partnership Strategy (CPS).

This project has been prepared to address poverty in rural communities. The Government's strategy for raising rural productivity and incomes rests on five pillars: (i) increasing crop yields and livestock productivity; (ii) producing higher-value crops and livestock; (iii) reducing crop and non-crop losses and reducing costs of producer inputs; (iv) strengthening the forward and backward linkages in the rural economy that stimulate investment, employment, and incomes in rural non-farm enterprises; and (v) reducing conflict between various land and water resources user groups.

Fadama (a Hausa word) are usually low-lying plains underlined by shallow aquifers and found along Nigeria's major river systems. Such lands are especially suitable for crop irrigation and fishing, and traditionally provide feed resources and water for livestock. Growth potential of this land is enormous, but only very partially developed. The Fadama I project which closed in 1999 and the ongoing Fadama II Project successfully adopted the small-scale irrigation development approach to utilize this potential. The cumulative impact of these earlier successful projects attests to the robustness of the small-scale and community-based approach to fadama development.

Although the ongoing Fadama II project is already recognized as a "good practice example" of a water resources management project by both the Government and the Independent Evaluations Group (IEG) of the World Bank, it is only a drop in the ocean, as the support provided under it meets only a very small portion of the needs of the poor in Nigeria, especially since only 18 of the 37 states of the country are covered.

The proposed Fadama III project will build on these successes and expand the scope of the project to include the remaining 19 states<sup>1</sup>, plus the Fadama II states which have demonstrated successful performance, especially in terms of disbursement and pro-poor impact, as well as support more diversified livelihood activities. The overarching development objective of the Fadama III Project is to sustainably increase the incomes of fadama users (thereby contributing to reduction of poverty, increased food security and achievement of a key MDG).

Activities to be developed namely in its component 2 "Small-scale community-owned infrastructure" will entail investment fund for community-driven sub-projects that include small scale rural infrastructures, infrastructures for sustainable Natural Resources Management including improved conservation of soils and agronomic practices and water harvesting techniques. Other components addresses advisory services and inputs supports; in addition to strengthening capacity of community-based associations for a variety of activities such as participatory planning and implementation, project design, participatory consultations, and micro-project implementation.

Some of these activities related to productive investments could lead to increase agricultural activities which in turn could bring about the use of pesticides (purchase of pesticides or

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<sup>1</sup> Abia, Anambra, Ebonyi, Enugu, Aka Ibom, Bayelsa, Cross River, Delta, Edo, Rivers, Ekiti, Ondo, Oshun, Benue, Nasarawa, Yobe, Kano, Sokoto and Zamfara.

spraying equipments) as farmers are finding some ways of improving their harvests. Increase of pesticides uses can be harmful to both the environment and public health. In accordance with the World Bank safeguard policies (OP 4.09 pest management) this pest management plan has been prepared to ensure that future sub projects do not engage in unsafe pest management.

The objective of this policy is to promote the use of biological or environmental control methods and reduce reliance on synthetic chemical pesticides and ensures that health and environmental hazards associated with pesticides are minimized. In Bank-financed agricultural operations, pest populations are normally controlled through Integrated Pest Management (IPM) approaches such as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest.

The Bank may finance the purchase of pesticides when their use is justified under an IPM approach and following some criteria concerning selection of pesticides:

- (a) They must have negligible adverse human health effects.
- (b) They must be shown to be effective against the target species.
- (c) They must have minimal effect on non-target species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies. Pesticides used in public health programs must be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them.
- (d) Their use must take into account the need to prevent the development of resistance in pests.

One of objectives of the pest management is to assess the capacity of the country's regulatory framework and institutions to promote and support safe, effective, and environmentally sound pest management and to incorporate in the project components to strengthen such capacity.

## ***SUMMARY OF RECOMMENDATIONS***

### **CONTEXT**

This pest<sup>2</sup> management plan (PMP) addresses the third National Fadama Development Project (also called Fadama III) need to monitor and mitigate negative environmental and social impacts of the project and promote ecosystem management. The PMP provides an information basis for stakeholder groups to establish functional mechanisms enabling fadama farmers to identify, understand and manage pest and vector problems in the further development of fadama agriculture, reduce personal and environmental health risks associated with pesticide use, and protect beneficial biodiversity such as natural enemies of pests and pollinators in the farmers' efforts to increase productivity.

The PMP also raises the need for fadama farmers to understand and respond to the external IPM environment affecting farmers' livelihoods. For example, quarantine pests, alien invasive species and stringent minimum pesticide residue levels limit the potential for farmers to benefit from international trade opportunities. Collaborative linkages between the project and international IPM groups will help to bring relevant expertise and supporting IPM resources developed elsewhere to strengthen national and local capacity to address pest problems faced by fadama farmers, develop a national IPM policy to encourage national and local compliance with international conventions and guidelines on pesticides, and to further develop IPM.

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<sup>2</sup> Pests = insects, mites, pathogens/diseases, weeds and other organisms that are detrimental to crop and livestock growth and productivity.

### RECOMMENDED ACTION

1. Diagnose pest problems affecting fadama crop and livestock production as the basis for FCA members to develop a shared vision on priority needs and IPM opportunities.
2. Develop the capacity of FCA members (especially the farmers) to understand and manage pest problems through farmer participatory learning approaches with complementary participatory research on feedback issues emanating from farmers' field experiences.
3. Introduce and promote microbial pesticides and botanicals as alternatives to harmful pesticide regimes and thereby reduce environmental and personal health risks in fadama agriculture: *With partnership inputs from the SP-IPM for sustainable access to microbial pesticides.*
4. Establish biodiversity monitoring schemes for early warning on changes in pest and vector status, natural enemy complexes, pollinators, and detect migratory pests and introduction of alien invasive species: *With partnership inputs from Nigeria node (at IAR/ABU) of the West African Network for Taxonomy (WAFRINET) and IITA biodiversity center for identification services.*
5. Develop/update a national IPM policy including national legislations governing the manufacture, registration, importation, distribution and use of pesticides in order to promote fadama compliance with the World Bank's safeguard Policies, OP 4.09 and BP 4.01, and other international conventions and guidelines on pesticide use: *With partnership inputs from FAO Regional Crop Protection Office, FAORAFa in Ghana and the Global IPM Facility for assistance to develop a national IPM policy document and establish a national IPM advisory and oversight committee (multi-stakeholder composition).*

### BUDGET

USD 440,000 will be required to effectively implement the proposed activities over five years. The budget is distributed as 49% for capacity building, 25% for advisory services, 15% for environmental management, and 11% for Fadama III management.

## PART 1: BACKGROUND

### FADAMA AGRICULTURE

In Nigeria, 69 million hectares of the total land area of 193 million hectares have potentials for crop and livestock production in diverse agroecologies (Table 1). Approximately 80% of the rural population is engaged in agriculture, and account for about 95% of production, mostly as a major economic activity. The farms are mainly small in sized (0.1 to 6 ha) and farming is largely under rain-fed conditions. A number of Federal government initiatives aim to increase agricultural production and reduce poverty.

These initiatives include the National Special Program on Food Security (NSPFS) being implemented with technical assistance from the FAO. The IFAD's Community-based Agricultural and Rural Development Programme (CBARDP) and Roots and Tubers Expansion Programme (RTEP). Presidential Initiatives covering key arable crops like cassava and rice, as well as livestock, fisheries, and tree crops, and the ongoing Second National Fadama Development Project (Fadama II) financed by the World Bank and the African Development Bank (AfDB).

The proposed Fadama III project scope will be national. It will include, first and foremost, the 19 states which did not benefit from the Fadama II project and the Fadama II states that meet the eligibility criteria. The Project's target group include: (a) the direct and indirect beneficiaries (farmers, pastoralists, fishermen, nomads, traders, processors, hunters and gatherers; (b) the disadvantaged groups (widows, the handicap, the sick and economically inactive---from HIV/AIDS or other diseases and other groups at risk; and (c) service providers, including private operators, professional/semi-professional associations operating in the project zone

Fadamas are flood plains and low-lying areas underlined by shallow aquifers and found along Nigeria's major river systems. The proposed project targets approximately 16 million household members, organized in approximately 80,000 Fadama User Groups (FUGs) and 37780 Fadama Committee Associations (FCAs) in nineteen States (plus selected Fadama II states that meets the eligibility criteria) distributed across varied ecological zones. The fadama agriculture is characterized by mixed cropping and livestock production. The major crops are cereals (e.g., maize, rice, wheat and sorghum), vegetables (e.g., onion, garlic, floated pumpkin, cabbage, garden-egg, carrots, lettuce, cucumber, potatoes, pepper and okra), grain legumes (cowpea), tuber crops such as potatoes, mostly under small scale irrigation systems.

In Northern Nigeria, the crops are in mono crops (mostly rice, wheat and vegetables), mixed cropping systems (e.g., maize/sorghum/millet-cowpea, maize/sorghum/millet-groundnut, and maize-cowpea with or without vegetables), double cropping systems (e.g. a mixed crop of maize/millet-cowpea-leafy vegetables as rain fed crops followed by mixed vegetables of onions-tomato-peppers as dry season irrigated crops; a second double cropping involves mixed rain fed crops of millet-cowpea with monoculture of onions tomatoes, or pepper in the dry season). In double cropping, the timely planting of successive crops and choice of short duration varieties are the most important strategies used to avoid conflicts of crop competition.

Table 1: Major crops cultivated in the agro-ecological zones

Agroecological Zone	Participating State	Principal Crops/livestock
Humid Forest (including Coastal Swamp and rain-forest)	Imo, Lagos, Ogun and Oyo	Flooded pumpkin, rice, maize, okra, garden eggs, pepper, tomato, amaranthus; sheep and goat, pigs.
Savanna (transition) (including Guinea and derived Savanna)	Kaduna, Niger, Plateau, FCT, Taraba, Kwara and Kogi	Rice, wheat, maize, sorghum, okra, garden eggs, pepper, tomato, onion, sugarcane, carrot, lettuce, green peas, flooded pumpkin, cowpea, soybean; cattle, sheep and goat
Sudan Savanna	Adamawa, Bauchi, Gombe, Borno, Kebbi, Katsina and Jigawa	Tomato, garlic, onion, pepper, wheat, rice, sorghum, sugarcane, cowpea, soybean, cucumber, cabbage, carrot; cattle sheep and goats

The overarching development objective of the Fadama III Project is to sustainably increase the incomes of fadama users (thereby contributing to reduction of poverty, increased food security and achievement of a key MDG). The PDO is to be achieved through an integrated approach including provision of matching grants to expand and diversify livelihood opportunities as well as the associated training and technical assistance support to empower the small and poor beneficiary fadama user groups with resources and the skills needed to properly use these resources for their own development.

The beneficiaries (farmers, pastoralists, fishermen, nomads, traders, processors, hunters and gatherers) will be encouraged to organize themselves into economic interest groups, named Fadama User Groups (FUGs), each having, on average, around 25 members. In addition, they will be encouraged to establish Fadama Community Associations (FCAs), which are apex organizations of on average 10 FUGs at the community level. The objective is to reach 5 FCAs per Local Government, or 1900 FCAs in the 380 LGs of the 19 eligible States

At the end of five years, Fadama III expects that 75% of the FCAs would have successfully implemented their respective Local Development Plans (LDPs) and other project supported activities, and that 50% of the target men and women fadama users would have increased their real income by 25% compared to baseline figures. A number of production constraints, e.g., erratic availability of water, pest damage, could challenge the realization of these milestones by the FCAs.

#### PEST PROBLEMS IN THE FADAMAS

In 1994, a technical review workshop on the fadamas summarized that the “lack of data to define the importance of pests and diseases in fadama agriculture has retarded the progress of crop protection”. The development situation has not changed much since then. The only comprehensive pest list of fadama agriculture is still the one produced for the Northern Nigeria in 1994 (Table 2).

Table 2: Crop pest list in fadama fields of Northern Nigeria, 1994

Crop	Pest	Disease
<b>Vegetables</b>		
1. Tomatoes	Nematodes ( <i>Meloidogyne</i> spp)	Bunchy top diseases
	Crickets	Leaf curl disease
	Fruitworm ( <i>Heliothis</i> spp)	Bushy stunt disease
	Whiteflies	Vascular wilt ( <i>Pseudomonas solanacearum</i> ) <i>Fusarium</i> spp Sclerotium spp
2. Onion	Crickets	Grey leaf blotch ( <i>Alternaria alternata</i> )
	Thrips	Purple blotch ( <i>Alternaria porri</i> ) Onion anthracnose ( <i>Colletotrichum cingulata</i> ) Onion rot ( <i>Fusarium oxysporium</i> )
3. Okra	Flea beetle ( <i>Podagrica</i> spp)	Powdery mildew ( <i>Erysiphe cichoracearum</i> )
	Cotton bollworm ( <i>Dysdercus</i> spp)	Leaf mosaic
	Nematodes ( <i>Meloidogyne</i> spp)	Leaf mosaic virus
<b>Cereals</b>		
1. Rice	Nematodes ( <i>Aphelenchoides besseyi</i> ; <i>Hirshmanniella grazilis</i> ; <i>H. oryza</i> ; <i>H. spinicaudata</i> )	Blast ( <i>Pyricularia oryzae</i> )
	Stem borers ( <i>Sesamia calamitis</i> ; <i>Chilo zacconius</i> ; <i>Maliarpha separetella</i> )	Brown leaf spot ( <i>Cochliobolus miyabeanus</i> )  Black kernel ( <i>Curvularia</i> spp)
2. Wheat	Quelea birds ( <i>Quelea quelea</i> )	Foot and root rot ( <i>Drechslera rostrata</i> ; <i>fusarium equiseti</i> ; <i>F. culmorum</i> ; <i>F. acuminatum</i> )
	Grasshoppers ( <i>Hieroglyphus daganensis</i> ; <i>Aiolopus similatrix</i> ; <i>Oedaleus senegalensis</i> ; <i>Namadacris septemfaciata</i> )	Rusts (Stem rust, brown rust and leaf rust)
	Nematodes ( <i>Meloidogyna incognita</i> ; <i>Javancia</i> )	Smut: loose smut
	Termites ( <i>Microtermes lepidus</i> )	
	Aphids ( <i>Rhopalosiphum maidis</i> ; <i>Methapolophium</i> spp; <i>Microsiphum</i> spp)	
	Stem borer ( <i>Sesamia calamistis</i> )	

Vegetable and cowpea production is a particular economic agricultural activity in many parts of the fadamas and good examples where IPM can reduce farmers' dependence on harmful pesticide regimes and increase income earning opportunities. Farmers often respond to pest infestations in these crops by heavy applications of pesticides which threaten environmental quality and pose risks to human and livestock health. Pesticides used in vegetable agroecosystems, for example, include WHO toxicity Class 1a materials such as parathion, and Class 1b materials such as Furadan/carbofuran. The incautious dependence on chemical pest control options undermines national economic growth through farmers' non-compliance with trade barriers on pesticide residues in export produce. According to EC directive 91/414, for example, approximately 80% of the active ingredients used in Africa will be banned for use in Europe, and IPM is a fast-emerging trade policy issue.



## PEST MANAGEMENT AND PESTICIDE USE POLICY

The general pest control objectives in the existing (1988) agricultural policy for Nigeria are to:

- Control, and/or eradicate and maintain good surveillance of the major economic pests whose outbreaks are responsible for large-scale damage/loss to agricultural production.
- Provide protection to man and animals against vectors of deadly diseases.

Towards this end, there are IPM implementation cases amongst the key crops in fadama agriculture. For example, for control of root knot nematodes in tomato and okra, farmers are encouraged to integrate resistant crop varieties with seed dressing and compatible crop rotation schemes to prevent build up of the pests. For downy mildew control in maize, farmer training by the Rice/Maize center in Ibadan has promoted the integration of resistant crop varieties with seed dressing (using Apron plus), timely identification, roguing and burning of affected plants and general farm hygiene. Similarly, IPM recommendations for control of the African Rice Gall Midge include combination of resistant crop varieties with seed dressing, timely planting, pest monitoring to guide pesticide applications.

Generally, however, in the responses to actual and potential pest threats to intensify agriculture, the Federal Ministry of Agriculture and Water Resources (FMAWR) annually purchases and distributes pesticides (through tender) to the States. A number of national institutions play different roles in the pesticide supply, and the Federal Government had issued a number of legislation and institutional framework using four main organizations (FMEH, FMH, NAFDAC and FMLP) for the regulation of the distribution and use of pesticides. The current legislative tools are:

- FEPA Decree 58 of 1988 as amended by Decree 59 of 1992 and 1999 but complemented by rules and regulations such as FEPA S.1.5, FEPA S.1.9 dealing with disposal and distribution/use of pesticides.
- NAFDAC Decree 15 of 1993, as amended by Decree 19 of 1999.
- The Factories Acts 1990 being implemented by the Factories Inspectorate Division of FMLP.
- The Harmful Waste (Special Criminal Provisions etc) Decree 42 of 1988 being implemented by FMEH

Based on the approval of the agencies mentioned above, Annexes 1 and 2 lists current banned and approved Pesticides stocks in Nigeria. FMAWR acts upon request of the Federal Pest Control Services which prepares the lists of pesticide needs for its operation. For example, N100 million was allocated on request in year 2001 through the Ecological Disaster Fund. In addition, the Federal Government purchased and distributed spraying equipment and protective gears. This and similar examples of pest related threats to investment projects, such as the ongoing Fadama II and the proposed Fadama III, highlight the need for robust Pest Management Plans as integral components of project implementation.

## **PART 2: COMPONENTS OF THE PMP**

### **PEST MANAGEMENT PLAN**

This Pest Management Plan (PMP) addresses the Fadama III project; and it is an update on the ongoing Fadama II project. It stress the need to monitor and mitigate negative environmental and social impacts of the project and promote ecosystem management.

The PMP provides an information basis for stakeholder groups to establish functional mechanisms enabling fadama farmers to identify, understand and manage pest and vector problems in the further development of fadama agriculture, reduce personal and environmental health risks associated with pesticide use, and protect beneficial biodiversity such as natural enemies of pests and pollinators in the farmers' efforts to increase productivity.

It further raises the need for fadama farmers to understand and respond to the external IPM environment affecting farmers' livelihoods. For example, quarantine pests, alien invasive species and stringent minimum pesticide residue levels limit the potential for farmers to benefit from international trade opportunities. Collaborative linkages between the project and international IPM groups will help to bring relevant expertise and supporting IPM resources developed elsewhere to strengthen national and local capacity to address pest problems faced by fadama farmers, develop a national IPM policy to encourage national and local compliance with international conventions and guidelines on pesticides, and to further develop IPM.

### **OBJECTIVES**

Table 3 summarizes the PMP matrix of objectives and activities. The PMP will enable Fadama III project to monitor pests and disease vectors and mitigate negative environmental and social impacts associated with pest/vector control in fadama agriculture and promote agroecosystem management. The plan provides fadama decision-makers and fadama users groups with clearer guidelines on integrated pest management (IPM) approaches and options to reduce crop and livestock losses with minimal personal and environmental health risks. Overall, the PMP will empower crop and livestock farmer groups to contribute significantly to household and national economies.

The specific objectives of the PMP are to:

- Assist fadama users to plan and design location specific IPM activities.
- Promote participatory approaches in IPM for farmers to learn, test, select and implement "best-bet" IPM options to reduce losses due to arthropod pests, diseases and weeds.
- Promote biodiversity monitoring to serve as early warning systems on pest status, alien invasive species, beneficial species, and migratory pests.
- Establish linkages to develop a national IPM policy to promote IPM and compliance with international conventions and guidelines on pesticide use in fadama agriculture.
- Monitor and evaluate the benefits of IPM including its impact on food security, the environment and health.

**ACTIVITIES AND RESULTS**

Table 4 outlines the matrix of activities, expected results, milestones and performance indicators of the PMP.

Table 3: Planning matrix for the Pest Management Plan of the Fadama III Project

Narrative summary	Expected results	Performance indicators	Assumptions/risks
<p><b>Goal:</b> Empower crop and livestock farmers to contribute significantly to household and national economies through environmentally friendly pest management practices.</p>	<ul style="list-style-type: none"> <li>• Food security enhanced, environmental quality improved, crop and livestock productivity and farmers' income increased</li> </ul>	<ul style="list-style-type: none"> <li>• Evidence of improvements in food availability, level of poverty, and environmental protection in FCAs.</li> </ul>	<ul style="list-style-type: none"> <li>• National security remains stable</li> <li>• Government policies continue to support food security programme</li> </ul>
<p><b>Purpose</b></p> <ol style="list-style-type: none"> <li>1. In the immediate future, halt and reverse losses cause by pests in order to increase profitability of fadama agriculture.</li> <li>2. In the longer term, strengthen national and local capacity to reduce environmental and health risks associated with pest management practices in the fadamas.</li> </ol>	<p><b>Medium-term results/outcomes</b></p> <ul style="list-style-type: none"> <li>• Farmers in FCAs prioritize their pest problems and identify IPM opportunities to mitigate negative environmental and social impacts associated with pesticides.</li> <li>• Farmers in FCAs adopt ecologically sound options to reduce crop and livestock losses with minimal personal and environmental health risks.</li> <li>• Fadama decision makers provided with clearer guidelines enabling them to promote IPM approaches and options in fadama agriculture</li> <li>• Collaborate linkages established to develop a national IPM policy to promote compliance with international conventions and guidelines on pesticide use</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of sufficient food.</li> <li>• Perception of state agencies regarding the value of IPM in fadama agriculture.</li> <li>• Level of compliance with World Bank etc.</li> <li>• Level of chemical control practices</li> <li>• Types and level of use of alternatives to synthetic pesticides</li> </ul>	

Table 4: Components activities and expected results of the PMP

Activities	Expected results	Milestones	Performance indicators	Assumptions/risks
<p>1. Record stakeholders' overviews on crop and livestock pests.</p> <p>2. Conduct field diagnosis to specify pests that undermine fadama agriculture.</p> <p>2. Identify farmers' coping mechanisms and researcher recommended IPM options against the pests.</p> <p>3. Develop and explain historical profile of pesticide use and other pest control practices in the fadamas.</p> <p>5. Specify partnership opportunities at local, national and international levels to assist in the implementation of the PMP</p>	<p><b>Result 1:</b> Members of FCAs and other relevant stakeholder groups develop common understanding of key pest problems and agree on corrective action.</p>	<ul style="list-style-type: none"> <li>• Pest problems diagnosed and related IPM opportunities identified</li> <li>• Potential constraints farmers may face in the use of the technologies specified</li> <li>• Pest lists including quarantine pests and alien invasive species developed.</li> <li>• Potential for improving existing pest control practices assessed</li> <li>• Pest monitoring schemes for early warning on alien invasive species and migratory pests are organized and functional</li> <li>• Action plan for location-specific IPM activities developed</li> <li>• PMP implementation mechanism developed by each cluster of 10 neighbouring FCAs</li> </ul>	<ul style="list-style-type: none"> <li>• Type and nature of participatory methods for problem analysis</li> <li>• Documented information on the status of pests and natural enemies of pest and pollinators in fadama agriculture.</li> <li>• Inventory of alien invasive species and quarantine pests</li> <li>• Types and availability of natural enemies for use in biological control of named pest</li> <li>• Types and availability of microbial pesticides and botanical pesticides to replace chemical pesticides</li> <li>• Type and number of crop rotation schemes to reduce build up of named pest species</li> <li>• Type of composting and mulching as alternatives to mineral fertilizers</li> <li>• List of principal actors and of partners</li> </ul>	<p>Social, economic and political situation remain stable</p>

Table 4 (contd.): Components activities and expected results of the PMP

Activities	Expected results	Milestones	Performance indicators	Assumptions/risks
<p>1. Develop participatory learning modules (PLM) in line with farmers identified training needs</p> <p>2. Conduct short to medium term training of farmer support groups on skills relevant to the PLMs</p> <p>3. Organize international study visits on specialized IPM skills of relevance to the PLMs</p> <p>4. Intensify training of men and women farmers in IPM knowledge and skills.</p> <p>5. Promote farmer-led extension to increase secondary adoption of proven IPM options</p> <p>6. Strengthen researcher-farmer-extension linkages through participatory research on issues emerging from farmer training</p> <p>7. Develop/disseminate IPM decision-support information resources for field agents, farmers, policy makers, and the general public</p>	<p><b>Result 2:</b> Human resource capacity for IPM delivery and implementation developed.</p> <p><i>In partnership with Nigeria/FAO project TCP/NIR/2903 (T) on sustainable legumes and cereal production through integrated production and pest management for synergy of efforts in participatory learning approaches, and with the CGIAR Systemwide Program on IPM (SP-IPM) for supporting IPM resources.</i></p>	<ul style="list-style-type: none"> <li>• One IPM orientation workshop per group of 50 FCAs organized in yr 1</li> <li>• PLM for crop/livestock and pest management practices developed and adapted to suit local needs</li> <li>• 3 sets of 2 week training of trainers courses for 90 extension agents (30 per each of 3 sub-regions) completed</li> <li>• At least 9000 farmers trained through participatory/experiential learning at 300 sites (clusters of 10 FCAs per site)</li> <li>• At least 3 sets of study visits organized for at most 12 technical support staff</li> <li>• Farmers accurately relate pests to respective damage symptoms; recognize natural enemies/biological control agents against the pests; test a range of IPM options and select “best-bet” options to implement and adopt.</li> <li>• At least 30% of trained farmers undertake participatory extension; and at least 50% farmers adopt new IPM options in targeted crop or livestock</li> <li>• At least 70% of information materials developed is disseminated and used by extension agents and farmers.</li> <li>• Significant reduction in pest damage by at least 30% of baseline data in target crop/livestock</li> </ul>	<ul style="list-style-type: none"> <li>• Type and number of PLMs developed</li> <li>• Type of IPM skills covered in study visits by agric staff</li> <li>• Number of farmers’ learning groups implemented</li> <li>• Gender and number of extension agents and of farmers trained.</li> <li>• Gender and number of trained farmers engaged in participatory extension</li> <li>• Extent to which new knowledge/skills are used by extension agents &amp; farmers to promote adoption of IPM options</li> <li>• Number &amp; type of IPM information materials developed/disseminated</li> <li>• Number and type of new IPM options introduced and adopted.</li> <li>• Gender and number of farmers adopting IPM technologies.</li> <li>• Area of crops under IPM</li> <li>• Incremental benefits due to pest control</li> <li>• Type and number of user-friendly taxonomic keys for pest and natural enemy recognition by farmers</li> </ul>	<p>Farmers adopt and apply new improved technologies.</p> <p>Fadama users and their service providers comply with international conventions guiding pesticide use and MRLs in trade</p> <p>Critical mass of staff trained remain within the fadama communities</p>

Table 4 (contd.): Components activities and expected results of the PMP

Activities	Expected results	Milestones	Performance indicators	Assumptions/risks
<p>1. Test and promote botanical alternatives to synthetic pesticides.</p> <p>2. Test and promote microbial alternatives to synthetic pesticides</p> <p>3. Develop/update a national IPM policy including legislation to govern the manufacture, importation, distribution and use of pesticides</p> <p>4. Establish a national IPM advisory and oversight committee to guide national and local compliance with World Bank safeguard Policies, OP 4.09 and BP 4.01 and other international conventions concerning pesticide use</p> <p>5. Sensitize the population on IPM issues and activities through formal and informal educational channels and public awareness campaigns</p>	<p><b>Result 3:</b> Harmful pesticide regimes replaced by environmentally friendly alternatives</p> <p><i>In partnership with the:</i></p> <p>1. <i>SP-IPM for sustainable access to microbial pesticides.</i></p> <p>2. <i>FAO Regional Crop Protection Office, FAORAFa in Ghana and the Global IPM Facility for assistance to develop a national IPM policy document and establish a national IPM advisory and oversight committee (multi-stakeholder composition).</i></p> <p>3. <i>Nigeria node (at IAR/ABU) of the West African Network for Taxonomy (WAFRINET) and IITA biodiversity center for identification services.</i></p>	<ul style="list-style-type: none"> <li>• Local commercial enterprises initiated and/or strengthened to produce and/or market botanical pesticides</li> <li>• At least one botanical pesticide widely used in place of chemical pesticides</li> <li>• At least one microbial pesticide registered and widely used in place of chemical pesticides</li> <li>• Surveillance systems to protect fadama agriculture from banned/harmful pesticide regimes is fully operational</li> <li>• Existing pesticide regulations are fully enforced</li> <li>• A multi-stakeholder National IPM advisory and oversight committee established to guide compliance with international conventions and guidelines on pesticide use, and promote the IPM development</li> <li>• Radio and other public campaigns on impact of pesticides in agriculture, environment and health conducted through radio and TV spots, mass field days, rural market days, information workshops, and focus groups discussions</li> </ul>	<ul style="list-style-type: none"> <li>• Level of reduction in chemical pesticide use; type and number of pesticides replaced by botanical or microbial pesticides</li> <li>• Number of commercial enterprises engaged in the production of botanical pesticides; and quality of the products</li> <li>• Volume of sale of microbial and botanical pesticides</li> <li>• Level of compliance with World Bank safeguard policies by fadama farmers and pesticide dealers/service providers</li> <li>• Effectiveness of the IPM advisory and oversight committee</li> <li>• Number of pest surveillance groups and pesticide law enforcement mechanisms</li> <li>• Effectiveness of public awareness of campaign</li> </ul>	<p>Government and development partners remain committed to international conventions and guidelines on safe pesticide use</p> <p>Critical mass of staff trained remain within the fadama communities</p>

## PART 3: IMPLEMENTATION STRATEGY

### CAPACITY BUILDING

The success of IPM depends largely on developing and sustaining institutional and human capacity to facilitate informed decision making by farmers, and empower farmers to integrate scientific and traditional knowledge to solve location-specific problems, and respond to market opportunities. Poor communication between farmers, extension agents and researchers has often led to poorly-targeted research or to poor adoption of promising options generated by research. The full benefits of investments in agricultural research thereby remain untapped under these circumstances. Farmer participatory research (FPR) and participatory learning (PL) approaches in capacity building efforts help to bridge this gap and make research results more understandable and useful by farmers. This is particularly the case in knowledge intensive disciplines such as IPM.

In IPM, there is the need for farmers to accurately identify and diagnose pests and pest problems, understand trophic relationships that underpin biological control opportunities, and use such knowledge to guide pesticide and other kinds of interventions. Through the participatory approaches Fadama III will build local capacity to ensure rapid spread and adoption of ecologically sound and environmentally friendly management practices in fadama communities. The farmers will learn biological and ecological processes underpinning IPM options, and use the newly acquired knowledge to choose compatible methods to reduce losses in production and post-harvest storage.

A foundation element of the capacity building exercise is diagnosis of pest problem and IPM opportunities to provide baseline information that will enable FCA stakeholder groups to develop a shared vision on felt needs and IPM strategies. Through informal interviews, field visits, and planning meetings, fadama stakeholder groups will develop joint understanding of the key issues affecting production and develop a common IPM plan based on agreed concerns.

The PMP implementation will be anchored at FCA level with field action by farmer groups which will receive training and advisory services from SFCOs, appropriate NGOs, and community leaders who would have graduated from **Training of Trainers (ToT)** sessions. Training at all levels will be based on participatory learning modules for capacity building in IPM information delivery. The participants will be equipped with skills in facilitation, group dynamics, non-formal education methods to encourage adult learning. Farmer training will focus on **farmers' group learning** for informed decision making on IPM issues. Group learning will be experiential through farmer-led field trials and discussions on practical aspects of crop and livestock production and pest management including indigenous knowledge/technologies. Farmer group learning will be facilitated by ToT trained men and women extension agents.

Group decision making will be achieved through AgroEcosystem Analysis (AESA) involving a comparison of IPM practices with normal farmer practices. At each AESA, farmers observe, record and monitor changes in soil, crop/livestock and trophic relationships affecting crop/livestock growth. Farmers analyse and discuss their findings and recommend corrective action based on the results of their own analyses. Group learning helps to increase scientific literacy, ownership of biological and ecological information and knowledge, and informed decisions making habits in the communities. For **participatory extension**, the FCA will establish new farmer learning groups in the community. Also trained farmers will be expected to promote secondary adoption of proven options. For example, each farmer trained will train at



least 10 new farmers through demonstrations and farm visits. Additionally the farmers will organize field days to train other farmers and explain new/improved IPM practices they have learnt. Field day participants will include representatives of national and local policy makers from government, development agencies, NGOs, rural and national press media, researcher institutes, and national extension services.

#### INSTITUTIONAL ARRANGEMENTS

Annual work plan will be developed in consultation with the FCA in line with their respective local action plans to indicate institutions and networks that will be required to provide research and development support. The principal actors will include a number of local institutions directly involved in implementing the PMP while other agencies (partners) will include international and national institutions to provide technical and other support for implementation of the plan.

Table 5: Actors and partners

Actors	Partners
<p>The actors will collaborate with Federal Pest Control Services (FPCS) and National Fadama Coordination Office (NFCO) of the Federal Ministry of Agriculture and Water Resources (FMAWR) to:</p> <ul style="list-style-type: none"> <li>• Contribute field staff to be trained as IPM Trainers.</li> <li>• Organize its members into farmer groups for training and promotion of IPM practices.</li> <li>• Facilitate extension and farmer training</li> <li>• Prepare and produce field guides and other relevant IPM information materials</li> <li>• Provide policy guidance/oversight for implementation of the PMP</li> <li>• Monitor, supervise and coordinate IPM activities</li> <li>• Document user compliance on pesticide use</li> </ul> <p>Examples of actors:</p> <ol style="list-style-type: none"> <li>1. FPCS</li> <li>2. NFCO</li> <li>3. Research Institutes and Universities</li> <li>4. Federal Ministry of Health (MH)</li> <li>5. National Agency for Food and Drug Administration and Control (NAFDAC)</li> <li>6. Fadama Community Association (as the principal beneficiaries)</li> <li>7. State Fadama Coordination Offices</li> <li>8. Federal Ministry of Health (for disease vector control)</li> <li>9. Federal Ministry of Environment and Housing Development (for environmental management)</li> <li>10. NAERLS (for materials production)</li> </ol>	<p>The partners will be IPM experts who:</p> <ul style="list-style-type: none"> <li>• Serve as technical reviewers for sub-projects submitted by FCAs for funding under Fadama III.</li> <li>• Provide technical support in pest and natural enemy identification</li> <li>• Assist to organize study tours and networking with international IPM groups.</li> <li>• Provide expertise in planning, training and field implementation of IPM</li> </ul> <p>Examples of partners:</p> <ol style="list-style-type: none"> <li>1. The CGIAR Systemwide Program on Integrated Pest Management (SP-IPM) which is dedicated to breaking isolation barriers to the full realization of IPM research results</li> <li>2. The Global IPM Facility which assists interested Governments and NGOs to initiate, develop and expand IPM programmes mostly through farmer field school training.</li> <li>3. Research institutes/universities (e.g., IAR/ABU for research support ) and thematic networks (e.g., the Nigeria node of the West Africa Network for Taxonomy, (WAFRINET-Nigeria, supported by IITA biodiversity center for pest and natural enemy identification and assessment)</li> <li>4. NGOs</li> </ol>

#### COORDINATION RESPONSIBILITIES

NFCO responsibilities are to standardize training needs assessment across sites; and organize national workshops to develop participatory learning modules.

SFCO responsibilities are to liaise with FCAs to plan training implementation; provide technical support such as in preparing and delivering specific training materials, and evaluating resource materials; identify and select suitable local training resource persons and materials; and prepare training progress reports.

The Local Fadama Desk (LFD) will collaborate with FCA to identify and organize farmers groups for training; prepare, organize and supervise training implementation plan; verify reports of persisting pest problems and farmers training needs; monitor performance of farmer trainers and post-training assignments; and prepare training progress reports

#### **MONITORING AND EVALUATION**

The following indicators will be incorporated into a participatory monitoring and evaluation plan.

Capacity to inform: Types and number of participatory learning modules (PLM) delivered; category and number of extension agents and farmers trained and reached with each PLM; category and number of participants reached beyond baseline figures; practical skills/techniques most frequently demanded by extension agents and farmers; and crop/livestock management practices preferred by farmers.

Capacity to motivate: Category and number of farmers who correctly apply the skills they had learnt; new management practices adopted most by farmers; category and number of other farmers trained by project trained farmers; types of farmer-innovations implemented; level of pest damage and losses; rate of adoption of IPM practices; impact of the adoption of IPM on production performance of Fadama farmers

Major benefits: Increase in crop/livestock production; increase in farm revenue; social benefits: e.g., improvement in the health status of farmers; level of reduction of pesticide purchase and use; and number of FCA families using preventive mechanisms against diseases.

#### **SUSTAINABILITY OF PROCESSES AND RESULTS**

Short-term technical study visits (to other West African countries with proven experience in IPM development and implementation) for hands-on laboratory and field training, and farmer participatory learning will help to create favourable conditions for continuity of IPM processes and results. The tour will involve both the regulatory authorities (e.g., FPCS and PCU) and members of the FCAs. Scientific information, adapted into user-friendly format will strengthen training and extension delivery, and increase IPM literacy in fadama communities. Strategic alliances with international IPM groups will strengthen national capacities to integrate new IPM options in crop and livestock production. Farmer-educational activities will be central to the exit strategy which will feature increased roles and responsibilities of committed national and local communities to take primary responsibilities in the development of action plans and expertise exchange for IPM development and promotion.

To support these gains, Fadama III will seek the assistance of FAO Regional Crop Protection office, FAORAFa Accra and the Global IPM Facility to develop/update a national IPM policy including national legislations governing the manufacture, importation, distribution and use of banned pesticides. Additionally a national IPM advisory and oversight committee (multi-stakeholder composition) will be established to promote national and local compliance with international conventions and guidelines on pesticides, and encourage the further development of IPM.

## PART 4: WORKPLAN AND BUDGET

Annual work plan will be developed in consultation with the FCA in line with their respective LDP. Approximately US\$ 440,000 will be required to effectively implement the PMP over a five-year period (Table 5).

Table 5 Budget summary

Line item	Yr. 1	Yr. 2	Yr. 3	Yr 4	Yr5	Total
<b>1. Capacity building</b>						
IPM orientation workshop	30000	15000	0	0	0	<b>45000</b>
Training of Trainers	45000	0	0	0	0	<b>45000</b>
Farmer group training	24000	24000	24000	24000	0	<b>96000</b>
Study visits	15000	10000	5000	0	0	<b>30000</b>
<i>Sub-total</i>	<i>114000</i>	<i>49000</i>	<i>29000</i>	<i>24000</i>	<i>0</i>	<i>216000</i>
<b>2. Advisory services</b>						
IPM problem diagnosis	16000	10000	10000	0	0	<b>36000</b>
Field guides/IPM materials	3000	15000	12000	0	0	<b>30000</b>
Public awareness/sensitization campaigns	4000	8000	8000	4000	3000	<b>27000</b>
Pest/vector surveillance	5000	5000	3000	3000	2000	<b>18000</b>
<i>Sub-total</i>	<i>28000</i>	<i>38000</i>	<i>33000</i>	<i>7000</i>	<i>5000</i>	<i>111000</i>
<b>3. Environmental management</b>						
Equipment; bed nets; chemicals, neem	5000	10000	5000	5000	0	<b>25000</b>
Support to IPM research and development	10000	15000	10000	6000	3000	<b>44000</b>
<i>Sub-total</i>	<i>15000</i>	<i>25000</i>	<i>15000</i>	<i>11000</i>	<i>3000</i>	<i>69000</i>
<b>4. Project management</b>						
PMP coordination	2000	2000	2000	2000	2000	<b>10000</b>
Monitoring and evaluation	7000	7000	13000	9000		<b>36000</b>
<i>Sub-total</i>	<i>9000</i>	<i>9000</i>	<i>15000</i>	<i>11000</i>	<i>2000</i>	<i>46000</i>
<b>Grand total</b>	<b>164000</b>	<b>119000</b>	<b>89000</b>	<b>48000</b>	<b>20000</b>	<b><u>440000</u></b>

**Annex 1: List of banned pesticides**

1. Aldrin      2. Chlordane      3. DDT (Dichlorophenyl trichloroethane)      4. Dieldrin      5. Endrin  
 6. Heptachlor      7. Toxaphene      8. Chlordimeform      9. Mercury Compounds      10. Luidane  
 11. Parathion      12. Methyl Marathion      13. Methyl bromide      14. Hexachlorobenzene

**Annex 2: List of crop and livestock protection products approved for use by NAFDAC**

## a) Insecticides

Organochlorines insecticides	Organophosphorus insecticides	Carbamates	Pyrethroids
1. Endosulfan	<b>Organophosphorus i</b>	1. Carbaryl	1. Lambda – Cyhalothrin
2. Heptachlor	1. Diazinon	2. Carbofuran	2. Cypermethrin
3. Lindane (Restricted to use on Cocoa only)	2. Dichlorvos (DDVP)	3. Propoxur	3. Deltamethrin
	3. Chlorpyrifos	4. Carbosulfan	4. Phenothrin
	4. Chlorpyrifos – Methyl	5. Furathiocarb	5. Permethrin
	5. Dicrotophos	6. Temik (Aldicarb)	6. Tetramethrin
	6. Dimethoate		7. Cyfluthrin
	7. Monocrotophos		8. Allethrin
	8. Perimiphos – Ethyl		
	9. Perimiphos – Methyl		
	10. Ethion		
	11. Rugby (Cadusofas)		
	12. Malathion		
	13. Temeguard (Temephos)		
	14. Isazofos		
	15. Parathion – Methyl		
	16. Phosphamedon		
	17. Methidathion		

## b) Herbicides and fungicides

Organophosphorus	Carbamates	Other herbicides	Fungicides
<b>Organophosphorus</b>	1. Asulam	1. Dimethachlor	1. Benomyl (Nitroheterocyclic Compound)
1. Anilofos		2. Metazachlor	2. Dazomet (Thiadiazine Fungicide)
2. Piperophos		3. Monosodium Methyl Arsonate (MSMA)	3. Folpet (Phthalimide Fungicide)
3. Glyphosate		4. Fluxixpyr	4. Metalaxyl (Acyllalamine Fungicide)
4. Glyphosate Trimesium (Touchdown or Sulfosate)		5. Imazaquine	5. Cyproconazole (Alto – 100SL)
5. Amideherbicides (Acetochlor; Alachlor; Propanil; Butachlor; Metalochlor)		6. Triassulfuran (Amber)	6. Bavistin (Carbon) – Benzimide
Triazines and Triazoles (Atrazine; Ametryn; Desmetryn; Terbutalazine; Terbutrex Terbutryne)		7. Osethoxydim	7. Triadmenol (Bayfidon GR Conzole Fungicide)
Chlorophenoxy herbicides (Prometryn; Simazine; 2,4-D (2,4 Dichlorphenoxy acetiacid))		8. Oxadiazon (Ronster)	
7. Urea and guadinidines ; (Diuron ; Linurex (=Linuron); Fluometurone; Chloroxuron; Neburon)		9. Clomaone	
Quaternary nitrogen compounds (paraquat;		10. Trifluralin	
		11. Stamp 500 (pendimethalin)	
		12. Fluazifop – P.butyl	

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