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Bureau for Food Security
Initial Environmental Examination (IEE)

Activity/Project Title: Feed the Future Partnering for Innovation (FTF-P4I)	
Contract/Award Number (if known): AID-OAA-A-12-0051/Sub-award PI-SMOG—Zambia Sub-award Title: Zasaka Agro Limited	
Geographic Location: Zambia	
Is this is an Amendment to an existing IEE? No Date & title of Original document: N/A ECD link:	
Funding: $400,000	
Implementation Start/End: 30 September 2016-30 September 2018	
Prepared By: Karen Menczer (Fintrac-P4I) BFS Office: Markets, Partnerships and Innovations	Date Prepared: 25 September 2016
Expiration Date (if any): 30 September 2018	EMMP Reporting dates: 30 July each year
Recommended Threshold Determination: X Negative Determination X with conditions Categorical Exclusion [include rationale per 216.2(c)]	▫ Deferral [include rationale per 216.3(a)(1)(iii)] ▫ Exemption [include rationale per 216.2(b)] ▫ Positive Determination [see 216.3(2)(iii)]

Environmental Mitigation and Monitoring Plan (EMMP):

As required by this IEE, an EMMP will be developed by the Implementing Partner (IP) per the conditions described in this IEE. The EMMP will be completed before activities start. A periodic EMMP Report shall be prepared by the IP to describe how well the monitoring and mitigation measures are working, and if any modifications are necessary. Guidance on BFS EMMP development is available at the BFS Environmental Compliance Tracking site. (EMMP is attached to this IEE.)

Gender Equality and Women's Empowerment

Per USAID policy, this IEE will consider the proposed activity in the full light of gender equity and women's empowerment related to environmental impact, not as a separate component, but as a core activity element.

Global Climate Change

Per USAID and Presidential directives, this IEE will consider proposed activity impact on global climate change, and in as much as possible, promote climate-smart agriculture, planning, and related activities. As applicable, project implementation will be cognizant of adaptation, integration, mitigation, clean energy and sustainable landscapes.

This Document: The purpose of the Initial Environmental Examination, in accordance with Title 22, Code of Federal Regulations, Part 216 (22CFR216), is to provide a preliminary review of the reasonably foreseeable effects on the environment of the described activity, and to recommend determinations and, as appropriate, conditions, for these activities. Upon final approval of this IEE, these recommended determinations are affirmed as 22 CFR 216 Threshold Decisions and Categorical Exclusions, and conditions become mandatory elements of implementation. This IEE is a critical element of a mandatory environmental review and compliance process meant to achieve environmentally sound activity design and implementation.

IEE SUMMARY:

1. Project Context

One of the biggest challenges in Zambia is that high quality basic and certified seed of varieties that are well-suited to smallholder needs are not being multiplied adequately or released on the market at opportune times. Zasaka Agro Limited is a for-profit social enterprise that increases income for smallholders in Zambia. Zasaka facilitates an outgrower model that loans high quality legume seed to small-scale farmers, trains them throughout the growing season, and buys back 100 percent of the certified seed crop at harvest for a premium price. Through this sub-award, Zasaka is addressing three of the main barriers to Zambian smallholders: access to inputs, access to knowledge, and access to a ready market.

2. Activity Description, Location, & Conditions

The specific activities to be supported by this sub-award are described in Section 2.1 of the IEE and are listed below in the Table in Section 5.

3. Potential Environmental Impacts

Potential environmental impacts of this activity are agricultural conversion, health and environmental impacts from pesticide use, and environmental impacts from improper use of chemical fertilizers.

4. Mitigation Conditions

The following mitigation measures are required as part of this sub-award:

Activity (1) Mitigation Measures

1) Zasaka shall not clear forest, drain wetland, or convert other valuable natural ecosystems to establish the foundation seed farm.

2) Zasaka shall submit a Safe Use Action Plan (SUAP) prior to procuring or using pesticides at the foundation seed farm, if the pesticides are included on the list of approved pesticides (Annex A) in the USAID/Zambia Pesticide Evaluation Report-Safer Use Action Plan (PERSUAP), or if not included on the list, shall submit an amended PERSUAP. The SUAP shall specify that neonicotinoid pesticides may be used for seed treatments and not for field treatments.

3) Zasaka shall implement best practices from the USAID AFR Bureau Fertilizer Fact Sheet (Annex B for an example) when applying fertilizers at the foundation seed farm.

Activity (2) Mitigation Measures

4) Zasaka shall provide safe pesticide use training using the safe use practices in the USAID/Zambia PERSUAP, including:

- Use of integrated pest management (IPM) and use of pesticides as a last resort pest management measure;
- Use of appropriate personal protection equipment (PPE);

Information on neonicotinoid pesticides and their effects on bee populations;

- Other measures in the PERSUAP to protect human health and the environment; and
- Recommending only those pesticides (active ingredients) approved for use in the PERSUAP and listed in Annex A. Use of pesticides rejected by the PERSUAP, also listed in Annex A, shall be discouraged.

5) Zasaka shall include fertilizer best use practices (see Annex B for an example) when training in fertilizer use.

Activity (3) Mitigation Measures

6) Prior to assisting outgrowers to obtain pesticides, Zasaka shall submit a SUAP if the pesticides to be obtained are on the approved list in Annex A, or an amended PERSUAP if they are not on the approved list. The SUAP shall specify that neonicotinoid pesticides may be used for seed treatments and not for field treatments.

7) Prior to assisting outgrowers to obtain fertilizers, Zasaka shall ensure that the outgrowers are trained in best practices in fertilizer use (see Annex B for an example).

Activity (6) Mitigation Measures

8) Prior to providing recommendations for pesticides, Zasaka shall submit a SUAP if the pesticides to be recommended are on the approved list in Annex A, or an amended PERSUAP if they are not on the approved list. The SUAP shall specify that neonicotinoid pesticides may be recommended only as seed treatments and not for field treatments.

9) When recommending fertilizer use, Zasaka shall incorporate best practices (see Annex B) as part of their technical assistance.

10) Zasaka shall discourage their ougrowers from converting natural ecosystems to agriculture.

Activity (7) Mitigation Measures

11) Zasaka shall ensure that when promoting fertilizers, they include information (brochures, labels, or other material) describing best practices for fertilizer use (See Annex B).

5. Threshold Determinations

Activity	Recommended Determination
(1) Zasaka, in partnership with IITA, will establish a 40 hectare foundation seed farm for multiplication of basic and certified legume seed.	**Negative Determination** with conditions in accordance with 22 CFR 216.3(a)(2)(iii)
(2) Zasaka will build the capacity of a PEA network to strengthen and expand their current outgrower model. Training will cover financial education, group management, agronomy, and program delivery.	**Negative Determination** with conditions in accordance with 22 CFR 216.3(a)(2)(iii)

(3) Zasaka will assist outgrowers to obtain, through a credit program, inputs other than seeds, such as fertilizer, manure, lime, insecticide, and herbicide.	**Negative Determination** with conditions in accordance with 22 CFR 216.3(a)(2)(iii)
(4) Zasaka will expand the capacity of its processing and sorting facility through mechanization and the hiring of new staff.	**Negative Determination** in accordance with 22 CFR 216.3(a)(2)(iii)
(5) Zasaka will test and evaluate the retail market using relatively low-risk strategies to explore the national market and regional markets in Eastern Province.	**Negative Determination** in accordance with 22 CFR 216.3(a)(2)(iii)
(6) Zasaka and IITA will collaborate on an ISFM pilot within Zasaka's outgrower network. Every Zasaka farmer will have their soil sampled and analyzed. Using these results, Zasaka will provide recommendations on incorporation of composted and blended manure, agroforestry using Musangu trees, and intercropping of cowpea with maize and including green manure.	**Negative Determination** with conditions in accordance with 22 CFR 216.3(a)(2)(iii)
(7) During the 2016-17 season, Zasaka will work with farmers in the outgrower program to apply 120 metric tons of composted manure blended with wide-spectrum fertilizer and/or lime.	**Negative Determination** with conditions in accordance with 22 CFR 216.3(a)(2)(iii)

APPROVAL OF ENVIRONMENTAL ACTION RECOMMENDED:

CLEARANCE:
Acting BFS/MPI Office Director: _____ Date: 11/2/16
Kelley Cormier

Agreement Officer Representative: _____ Date: 11/2/2016
Aviva Kutnick

CONCURRENCE:
BFS Bureau Environmental Officer: _____ Date: 11-2-2016
William Thomas

cc: USAID/Zambia Mission Environmental Officer

Filename/location: P:\BFS.MPI\FTF Partnering for Innovation\Component 2- Mission Buy-Ins\Zambia\Zambia Zasaka Agro Limited
BFS Tracking #: BFS-16-9-008

BFS Initial Environmental Examination (IEE)

1. Project Context

A recent USAID study places legume seed availability at less than 50 percent of demand. High quality seed is a basic and essential input for crop productivity. Improved seed is one of the most efficient ways to increase productivity without necessarily altering behavior or making large-scale investments. One of the biggest challenges in Zambia is that high quality basic and certified seed of varieties that are well-suited to smallholder needs are not being multiplied adequately or released on the market at opportune times.

Zasaka is a for-profit social enterprise that increases income for smallholders in Zambia. Zasaka facilitates an outgrower model that loans high-quality legume seed to small-scale farmers, trains them throughout the growing season, and buys back 100 percent of the certified seed crop at harvest for a premium price. Through this sub-award, Zasaka is addressing three of the main barriers to Zambian smallholders: access to inputs, access to knowledge, and access to a ready market.

2. Activity Description, Location, & Baseline

2.1. Activity Description

The purpose of this sub-award is to scale up Zasaka's current outgrower model to increase smallholder incomes through improved practices and production of legume seeds. To accomplish this, Zasaka will build the capacity of their Private Agricultural Extension (PEA) network, increase the availability of legume seeds on their own farm and by engaging smallholder outgrowers, and improve smallholder soil quality via analysis and the launch of blended compost fertilizer tailored to smallholder needs. Interventions will focus on three interconnected legume markets, soybean, groundnut, and cowpea.

The following are the specific activities that will be implemented under this sub-award to Zasaka:

(1) Zasaka, in partnership with International Institute of Tropical Agriculture (IITA), will establish a 40 hectare foundation seed farm for multiplication of basic and certified legume seed. The foundation farm will ensure timely infusion of fresh germplasm, a secure seed stock, and consistent availability for smallholders. Basic and certified seed produced at the foundation farm will feed directly into Zasaka's outgrower program.

(2) Zasaka will build the capacity of a Private Extension Agent (PEA) network to strengthen and expand their current outgrower model. Zasaka will recruit and train more than 800 PEAs to serve 32,000 farmers. Select PEAs will enter an intensive month-long participatory training program called PEA College. The agents will meet every weekday for a month as they sharpen their skills in financial education, group management, agronomy, and program delivery. Through the PEAs, Zasaka actively engages with outgrowers throughout the growing season via bi-weekly training and frequent field visits.

(3) Zasaka will assist outgrowers to obtain, through a credit program, inputs other than seeds, such

as fertilizer, manure, lime, insecticide, and herbicide.

(4) Zasaka will expand the capacity of its processing and sorting facility through mechanization and the hiring of new staff. Zasaka will package seed from the foundation farm under their *Good Nature Seed* brand to sell through agro-dealers to farmers. The seed produced by Zasaka and IITA on the foundation farm will be customized to smallholder farmers' most important needs: protection against drought and climate change through shortened growing seasons, high biomass productions, high yield, and efficient use of external nutrients from fertilizers.

(5) Zasaka will test and evaluate the retail market using relatively low-risk strategies to explore the national market and regional markets in Eastern Province. Over the next two years, Zasaka plans to increase the percentage of retail sales to 40 percent. The planned marketing approach to farmers is to 1) focus on diversification, then 2) to encourage farmers to buy the Zasaka brand over other legume seed brands because of improved quality, availability, affordability, and end-market access.

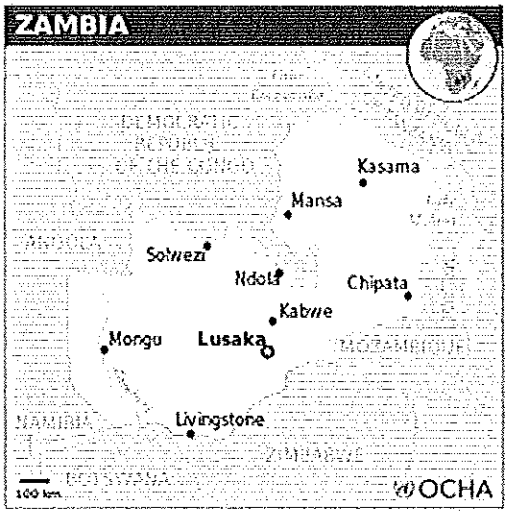
(6) Zasaka and IITA will collaborate on an Integrated Soil Fertility Management (ISFM) pilot within Zasaka's outgrower network. The goal of the pilot is to increase farmers' field nutrition and organic matter in a user-friendly form of application. Every Zasaka farmer will have their soil sampled and analyzed. Using these results, Zasaka will provide recommendations on incorporation of composted and blended manure, agroforestry using Musangu trees, and intercropping of cowpea with maize and including green manure. Musangu trees are considered indigenous to Zambia and have many uses, including for firewood, charcoal, lumber, posts, medicine, windbreaks, and crop production. Musangu trees lose their leaves and seed pods, adding organic matter, nitrogen, and other nutrients to the soil. The loss of leaves also enables nearly full sunlight to reach the plants and ground below. Musangu can be so effective at adding nutrients back to the soil that crops grown under its canopy need no added chemical fertilizer.

(7) During the 2016-17 season, Zasaka will work with farmers in the outgrower program to apply 120 metric tons of composted manure blended with wide-spectrum fertilizer and/or lime. Zasaka will track production and soil analysis results from these farmers.

2.2. Location

Figure 1 shows Zambia's location in south-central Africa. According to http://www.nationsonline.org/oneworld/zambia.htm, Zambia's land area is 285,994 sq miles (740,724 sq km) and the total area of the country is 290,586 sq miles. The 2014 population was approximately 14,638,505. The annual population growth rate is 2.88%.

The capital city is Lusaka in the south-central part of Zambia. Zambia's population is concentrated mainly around Lusaka and in the Copperbelt Province to the northwest, the core economic hubs of the country.



(Figure 1. Map of Zambia From: https://en.wikipedia.org/wiki/Zambia)

The following is from https://en.wikipedia.org/wiki/Zambia. Zambia is drained by two major river basins: the Zambezi/Kafue basin in the center, west, and south covering about three-quarters of the country; and the Congo basin in the north covering about one-quarter of the country. A very small area in the northeast forms part of the internal drainage basin of Lake Rukwa in Tanzania.

In the Zambezi basin, there are a number of major rivers flowing wholly or partially through Zambia: the Kabompo, Lungwebungu, Kafue, Luangwa, and the Zambezi, which flows through the country in the west and then forms its southern border with Namibia, Botswana, and Zimbabwe. Two of the Zambezi's longest and largest tributaries, the Kafue and the Luangwa, flow mainly in Zambia. The Zambezi falls about 100 meters (328 ft) over the 1.6 km (0.99 mi) wide Victoria Falls, located in the southwest corner of the country, subsequently flowing into Lake Kariba.

In Eastern Zambia the plateau which extends between the Zambezi and Lake Tanganyika valleys is tilted upwards to the north, and rises from about 900 m (2,953 ft) in the south to 1,200 m (3,937 ft) in the center, reaching 1,800 m (5,906 ft) in the north near Mbala.

According to the USAID/Zambia IEE for the Economic Development (EDEV) Portfolio (July 2015), data on deforestation rates are poor. The current annual deforestation rate is 250,000 to 300,000 ha/year (UN-REDD Programme Zambia, 2010). This is lower than previous estimates of 445,000 ha/year (Campbell et al., 2007) or 850,000 ha/year (FAO, 2005). Previous estimates had placed Zambia in fourth place globally, behind Brazil, Indonesia, and Sudan, for percentage rate of area deforested. Rapid population growth and rural-urban migration, combined with limited job opportunities, lead to over-exploitation of forest reserves and illegal off-take of wildlife and fish. In addition, most Zambians depend on either wood fuel or charcoal for their domestic energy supply. These trends explain why Zambia is threatened with a deforestation rate among the highest in Africa.

The USAID/Zambia Environmental Threats and Opportunities Assessment (March, 2011) states that there are 625 nationally recognized protected areas (PAs) in Zambia, covering approximately

309,052 sq km or about 41% of the country's territorial area. Included in this number are 480 forest reserves covering a total land area of about 7.2 million hectares.

The ETOA identified the following key threats to Zambia's environment:

- Unsustainable Agricultural Practices
- Climate Change
- Charcoal Production
- Illegal Off-takes
- Mining Operations and Expansion
- Poor Governance

The ETOA recommended the following to address the threats:

- Conservation Agriculture
- Public-Private Conservation Partnerships
- Integrated Land Use Planning
- High Efficiency Cook Stoves
- Monitoring, Reporting and Verification
- Urban Health and Environment Improvements

2.3. Project Baseline

Zasaka works in the Eastern Province of Zambia. The Eastern Province lies between the Luangwa River and the border with Malawi to the east; Mozambique to the south; Isoka in the northeast; and just north of Luangwa in the south. The population was 1,592,661 in the 2010 census - about 12% of Zambia's total population.

As shown in the map below (Figure 2), the vegetation of Eastern Province is mainly miombo and mopane woodlands. Mopane woodland, covering about 15% of the country in the south, has more scattered and generally smaller trees, and the relative proportion of woody shrubs is greater. The mopane tree, *Colophospermum mopane*, is a legume and grows in hotter locations than the miombo species, and so mopane woodlands, covering about 15% of the country, replace southern miombo woodlands at lower elevations in valleys in the south of the country.

Most of the Luangwa Valley in the Eastern Province is protected by national parks or game management areas (GMAs) comprising one of the world's greatest wildlife areas, which includes North Luangwa National Park, South Luangwa National Park, Luambe National Park, Lukusuzi National Park, and Munyamadzi, Musalangu, Mukumgule, Lupande, Lumimba, Sandwe, and Chisomo GMAs. In these parks and GMAs, poaching of elephant and rhinoceros has been a problem in recent years.

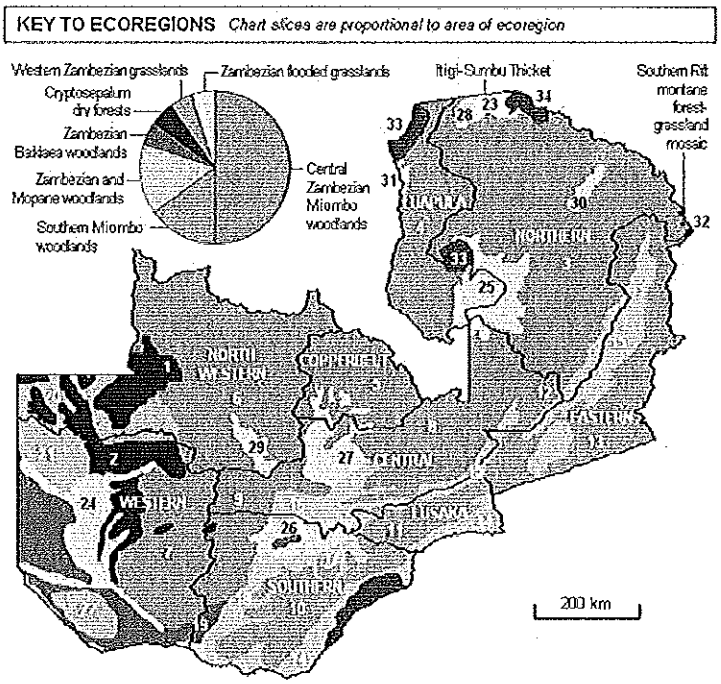


Figure 2. Ecoregions of Zambia

According to the USAID/Zambia IEE, Economic Development (EDEV) Portfolio (July 2015) IEE, approximately two-thirds of Zambians live in rural areas and are dependent on agriculture for their livelihoods. Traditional small-scale agricultural practices are not productive, and yields for key staples are one-half or less than the world average. Continuous use of synthetic fertilizers without the use of lime or use of legumes may also lead to lower soil fertility and high pH levels. Low soil quality leads to farmers abandoning existing holdings to migrate to land that is more fertile. The cycle is then repeated. By supporting ISFM, and by providing access to lime, this sub-award addresses poor soil quality, which in part addresses shifting agriculture.

3. Potential Environmental Impacts

The following are the potential environmental impacts of proposed activities under this sub-award to Zasaka:

(1) Zasaka, in partnership with IITA, will establish a 40 hectare foundation seed farm for multiplication of basic and certified legume seed.

Depending on the location of the farm, this could result in environmental impacts, specifically conversion of natural ecosystems to agriculture. If pesticides and fertilizers are used on the farm, human health and environmental impacts could result.

(2) Zasaka will build the capacity of a PEA network to strengthen and expand their current outgrower model. Training will cover financial education, group management, agronomy, and program delivery.

Training in business and administration topics will have no environmental impacts. Training in

agronomy topics could have indirect environmental impacts, in particular if training is on pesticide and fertilizer use.

(3) Zasaka will assist outgrowers to obtain, through a credit program, inputs other than seeds, such as fertilizer, manure, lime, insecticide, and herbicide.

Provision of inputs, in particular, fertilizer and pesticides, could have human health and environmental impacts.

(4) Zasaka will expand the capacity of its processing and sorting facility through mechanization and the hiring of new staff.

Mechanization of seed processing and sorting will have no adverse environmental impacts. Mechanization produces no waste products that need to be disposed. No other biological or physical environmental effects result from processing and sorting seed.

(5) Zasaka will test and evaluate the retail market using relatively low-risk strategies to explore the national market and regional markets in Eastern Province.

Implementing a marketing strategy has no direct or indirect adverse environmental impacts.

(6) Zasaka and IITA will collaborate on an ISFM pilot within Zasaka's outgrower network.

Soil testing has no environmental impacts. Zasaka's recommendations based on soil testing could indirectly impact the environment. Recommendations on pesticide and fertilizer use could have environmental and human health impacts. Environmental impacts could result if Zasaka's recommendations result in conversion of valuable natural ecosystems to agriculture. Promotion of Musangu trees will have positive environmental effects. As stated above, low soil quality leads farmers to abandon existing holdings to migrate to land that is more fertile; this is a main cause of deforestation and conversion of natural ecosystems to agriculture. Use of the Musangu tree addresses the problem of low soil fertility.

(7) During the 2016-17 season, Zasaka will work with farmers in the outgrower program to apply 120 metric tons of composted manure blended with wide-spectrum fertilizer and/or lime.

Use of fertilizer, without implementation of best practices, could have environmental impacts. Both nitrogen and phosphorus can result in eutrophication of waterways, and can degrade groundwater.

This sub-award addresses climate change adaptation by producing and distributing seed that is customized to smallholder farmers' most important needs: protection against drought and climate change through shortened growing seasons, high biomass productions, high yield, and efficient use of external nutrients from fertilizers.

4. Mitigation Conditions

Zasaka shall implement the following mitigation measures. With implementation of these measures, these activities will not have a significant effect on the environment.

Activity (1) Zasaka, in partnership with IITA, will establish a 40 hectare foundation seed farm for multiplication of basic and certified legume seed.

Mitigation Measures

1) Zasaka shall not clear forest, drain wetland, or convert other valuable natural ecosystem to establish the foundation seed farm.

2) Zasaka shall submit a Safe Use Action Plan (SUAP) prior to procuring or using pesticides at the foundation seed farm, if the pesticides are included on the list of approved pesticides (Annex A) in the USAID/Zambia Pesticide Evaluation Report-Safer Use Action Plan (PERSUAP), or if not included on the list, shall submit an amended PERSUAP. The SUAP shall specify that neonicotinoid pesticides may be used for seed treatments and not for field treatments.

3) Zasaka shall implement best practices from the USAID AFR Bureau Fertilizer Fact Sheet (Annex B for an example) when applying fertilizers at the foundation seed farm.

Activity (2) Zasaka will build the capacity of a PEA network to strengthen and expand their current outgrower model. Training will cover financial education, group management, agronomy, and program delivery.

Mitigation Measures

4) Zasaka shall provide safe pesticide use training using the safe use practices in the USAID/Zambia PERSUAP, including:

- Use of integrated pest management (IPM) and use of pesticides as a last resort pest management measure;
- Use of appropriate personal protection equipment (PPE);
  Information on neonicotinoid pesticides and their effects on bee populations;
- Other measures in the PERSUAP to protect human health and the environment; and
- Recommending only those pesticides (active ingredients) approved for use in the PERSUAP and listed in Annex A. Use of pesticides rejected by the PERSUAP, also listed in Annex A, shall be discouraged.

5) Zasaka shall include fertilizer best use practices (see Annex B for an example) when training PEAs in fertilizer use.

Activity (3) Zasaka will assist outgrowers to obtain, through a credit program, inputs other than seeds, such as fertilizer, manure, lime, insecticide, and herbicide.

Mitigation Measures

6) Priof to assisting outgrowers to obtain pesticides, Zasaka shall submit a SUAP if the pesticides to

be obtained are on the approved list in Annex A, or an amended PERSUAP if they are not on the approved list. The SUAP shall specify that neonicotinoid pesticides may be used for seed treatments and not for field treatments.

7) Prior to assisting outgrowers to obtain fertilizers, Zasaka shall ensure that the outgrowers are trained in best practices in fertilizer use (see Annex B for an example).

Activity (6) Zasaka and IITA will collaborate on an ISFM pilot within Zasaka's outgrower network.

Mitigation Measures
8) Prior to providing recommendations for pesticides, Zasaka shall submit a SUAP if the pesticides to be recommended are on the approved list in Annex A, or an amended PERSUAP if they are not on the approved list. The SUAP shall specify that neonicotinoid pesticides may be recommended only as seed treatments and not for field treatments.

9) When providing recommendations for fertilizer use, Zasaka shall incorporate best practices (see Annex B) as part of their technical assistance.

10) Zasaka shall discourage their ougrowers from converting natural ecosystems to agriculture.

Activity (7) During the 2016-17 season, Zasaka will work with farmers in the outgrower program to apply 120 metric tons of composted manure blended with wide-spectrum fertilizer and/or lime.

Mitigation Measures
11) Zasaka shall ensure that when promoting fertilizers, they include information (brochures, labels, or other material) describing best practices for fertilizer use (See Annex B).

5. Threshold Determinations

Recommended Threshold Determinations

In accordance with this analysis, the following determinations are recommended for this activity:

Activity	Recommended Determination
(1) Zasaka, in partnership with IITA, will establish a 40 hectare foundation seed farm for multiplication of basic and certified legume seed.	**Negative Determination** with conditions in accordance with 22 CFR 216.3(a)(2)(iii)
(2) Zasaka will build the capacity of a PEA network to strengthen and expand their current outgrower model. Training will cover financial education, group management, agronomy, and program delivery.	**Negative Determination** with conditions in accordance with 22 CFR 216.3(a)(2)(iii)
(3) Zasaka will assist outgrowers to obtain, through a credit program, inputs other than seeds, such as fertilizer, manure,	**Negative Determination** with conditions in accordance with 22 CFR

lime, insecticide, and herbicide.	216.3(a)(2)(iii)
(4) Zasaka will expand the capacity of its processing and sorting facility through mechanization and the hiring of new staff.	**Negative Determination** in accordance with 22 CFR 216.3(a)(2)(iii)
(5) Zasaka will test and evaluate the retail market using relatively low-risk strategies to explore the national market and regional markets in Eastern Province.	**Negative Determination** in accordance with 22 CFR 216.3(a)(2)(iii)
(6) Zasaka and IITA will collaborate on an ISFM pilot within Zasaka's outgrower network. Every Zasaka farmer will have their soil sampled and analyzed. Using these results, Zasaka will provide recommendations on incorporation of composted and blended manure, agroforestry using Musangu trees, and intercropping of cowpea with maize and including green manure.	**Negative Determination** with conditions in accordance with 22 CFR 216.3(a)(2)(iii)
(7) During the 2016-17 season, Zasaka will work with farmers in the outgrower program to apply 120 metric tons of composted manure blended with wide-spectrum fertilizer and/or lime.	**Negative Determination** with conditions in accordance with 22 CFR 216.3(a)(2)(iii)

General Project Implementation and Monitoring Requirements

1. Integration and implementation of EMMP. Zasaka shall integrate the below EMMP into their project work plan, implement the EMMP, and report on its implementation as an element of their quarterly reporting.
2. Compliance with Host Country Requirements. Nothing in this IEE substitutes for or supersedes Zasaka's responsibility for compliance with all applicable Zambian laws and regulations. Zasaka must comply with Zambia's environmental regulations unless otherwise directed in writing by P4I.

6. Environmental Mitigation & Monitoring Plan

Zasaka's Project Manager is responsible for oversight of this EMMP. The Project Manager will collect monitoring data and will report to P4I quarterly, who will report to USAID in their quarterly reports. The quarterly report shall discuss status of mitigation measures, successes, and need for remedial action or other environmental compliance actions.

Zasaka Agro Limited EMMP

Activity	*Potential impact*	*Mitigation measures*	*Monitoring indicators*	*Monitoring methods & frequency*
(1) Zasaka, in partnership with IITA, will establish a 40 hectare foundation seed farm for multiplication of basic and certified legume seed.	Depending on the location of the farm, this could result in environmental impacts, specifically conversion of natural ecosystems to agriculture.	1) Zasaka shall not clear forest, drain wetland, or convert other valuable natural ecosystem to establish the foundation seed farm.	Establishment of seed farm does not require conversion	Site visit prior to establishing seed farm to confirm this
	If pesticides and fertilizers are used on the farm, human health and environmental impacts could result.	2) Zasaka shall submit a Safe Use Action Plan (SUAP) prior to procuring or using pesticides at the foundation seed farm, if the pesticides are included on the list of approved pesticides (Annex A) in the USAID/Zambia Pesticide Evaluation Report-Safer Use Action Plan (PERSUAP), or if not included on the list, shall submit an amended PERSUAP. The SUAP shall specify that neonicotinoid pesticides may be used for seed treatments and not for field treatments.	SUAP or amended PERSUAP approved prior to procuring or using pesticides at foundation seed farm	Review USAID approvals when obtained
		3) Zasaka shall implement best practices from the USAID AFR Bureau Fertilizer Fact Sheet (Annex B for an example) when applying fertilizers at the foundation seed farm.	Best practices implemented	Site visits to seed farm to confirm
(2) Zasaka will build the capacity of a PEA network to strengthen	Training in agronomy topics could have indirect environmental impacts, in	4) Zasaka shall provide safe pesticide use training using the safe use practices in the USAID/Zambia	SUAP or amended PERSUAP.	Review USAID approvals when obtained

and expand their current outgrower model. Training will cover financial education, group management, agronomy, and program delivery.	particular if training is on pesticide and fertilizer use.	PERSUAP, including: • Use of integrated pest management (IPM) and use of pesticides as a last resort pest management measure; • Use of appropriate personal protection equipment (PPE); Information on neonicotinoid pesticides and their effects on bee populations; • Other measures in the PERSUAP to protect human health and the environment; and • Recommending only those pesticides (active ingredients) approved for use in the PERSUAP and listed in Annex A. Use of pesticides rejected by the PERSUAP, also listed in Annex A, shall be discouraged.	approved prior to training on pesticides	
		5) Zasaka shall include fertilizer best use practices (see Annex B for an example) when training PEAs in fertilizer use.	Training curricula include best practices	Review training curricula annually
(3) Zasaka will assist outgrowers to obtain, through a credit program, inputs other than seeds, such as fertilizer, manure, lime, insecticide, and herbicide.	Provision of inputs, in particular, fertilizer and pesticides, could have human health and environmental impacts.	6) Prior to assisting outgrowers to obtain pesticides, Zasaka shall submit a SUAP if the pesticides to be obtained are on the approved list in Annex A, or an amended PERSUAP if they are not on the approved list. The SUAP shall specify that neonicotinoid pesticides may be used for seed treatments and not for field treatments.	SUAP or amended PERSUAP approved prior to assisting outgrowers to obtain pesticides	Review USAID approvals when obtained
		7) Prior to assisting outgrowers to obtain fertilizers, Zasaka shall ensure that the outgrowers are trained in best practices in fertilizer use (see Annex B for an example).	Training curricula include best practices	Review training curricula annually
Activity (6) Zasaka and IITA will collaborate on an ISFM pilot within Zasaka's outgrower network. Every Zasaka farmer will have their soil sampled and analyzed. Using these results, Zasaka will provide recommendations on	Recommendations on pesticide and fertilizer use could have environmental and human health impacts.	8) Prior to providing recommendations for pesticides, Zasaka shall submit a SUAP if the pesticides to be recommended are on the approved list in Annex A, or an amended PERSUAP if they are not on the approved list. The SUAP shall specify that neonicotinoid pesticides may be recommended only as seed treatments and not for field treatments.	SUAP or amended PERSUAP approved prior to recommending pesticides	Review USAID approvals when obtained

incorporation of composted and blended manure, agroforestry using Musangu trees, and intercropping of cowpea with maize and including green manure.		9) When providing recommendations for fertilizer use, Zasaka shall incorporate best practices (see Annex B) as part of their technical assistance.	Technical assistance includes best practices	Review Zasaka documentation annually showing TA includes best practices
	Environmental impacts could result if Zasaka's recommendations result in conversion of valuable natural ecosystems to agriculture.	10) Zasaka shall discourage their ougrowers from converting natural ecosystems to agriculture.	Technical assistance discourages conversion	Review Zasaka documentation annually showing TA includes best practices
(7) During the 2016-17 season, Zasaka will work with farmers in the outgrower program to apply 120 metric tons of composted manure blended with wide-spectrum fertilizer and/or lime.	Use of fertilizer, without implementation of best practices, could have environmental impacts. Both nitrogen and phosphorus can result in eutrophication of waterways, and can degrade groundwater.	11) Zasaka shall ensure that when promoting fertilizers, they include information (brochures, labels, or other material) describing best practices for fertilizer use (See Annex B).	Brochures, labels, etc. include best practices and are distributed	Review Zusaka documentation annually

Annex A: Pesticides Approved in the USAID/Zambia DO2 PERSUAP (PERSUAP expires 30 September 2018)

The following pesticides have been approved for use in USAID/Zambia DO 2 programs with the condition that mitigation measures described in the PERSUAP are implemented. Prior to providing support (including providing pesticides and using pesticides on the foundation farm), Zasaka must submit a Safer Use Action Plan (SUAP) to the COR (if pesticides are approved for use in the list below). If pesticides other than those listed below will be supported, P4I, in consultation with Zasaka, will submit an amended PERSUAP prior to providing such support.

Only the below-listed pesticides (active ingredients) are permitted for use/support and can only be used/supported with the mitigation measures described in the PERSUAP, including the development of a SUAP specific to this sub-award. For reference, AIs evaluated in the PERSUAP, but not approved, are also listed.

Allowed Fumigant AIs **(with strict conditions)**	
• aluminum phosphide for stored grains (for use only by trained and certified applicators, not farmers; see Fumigation PEA) • metam sodium for soil pests, diseases and weed seeds (for use only by trained and certified applicators, not farmers; see Fumigation PEA)	
Allowed Miticide AIs registered by ZEMA	**Miticide** AIs registered by ZEMA and considered but **Rejected for "Use" by USAID Projects**
• abamectin/avermectin (use only formulations below 1.9%)	• tetradifon (not EPA registered)

• amitraz		
Allowed Insecticide AIs registered by ZEMA		**Insecticide** AIs registered by ZEMA and considered but **Rejected for "Use" by USAID Projects**
• abamectin/avermectin (use only formulations below 1.9%) • acetamiprid (but only when plants are in vegetative state, not when flowering due to risk to pollinators and honeybee colony collapse disorder) • dichlorvos/DDVP (use only acute toxicity Class II and III products; not Class I) • chlorpyrifos-ethyl (for uses except spraying for household pests, favor the use of granular formulations for soil pests) • cyfluthrin (use only acute toxicity Class III products; not Class II) • cypermethrin (registered USA for medical, veterinary and household use) • deltamethrin • dimethoate • ethofenprox • fenitrothion • imidacloprid (but only when plants are in vegetative state, not when flowering due to risk to pollinators and honeybee colony collapse disorder) • lambda cyhalothrin (use only formulations 10% and below) • methomyl (use only acute toxicity Class II and III products; not Class I) • permethrin • pyrimiphos-methyl • propoxur		• acrinathrin (not EPA registered) • alpha-cypermethrin (not EPA registered) • benthiocarb (not EPA registered) • carbofuran (RUP, Class I) • cartap hydrochloride (not EPA registered) • chlorfenvinphos (not EPA registered) • endosulfan (being phased out as banned under POPs Treaty) • fenamiphos (not EPA registered) • methamidophos (not EPA registered) • monocrotophos (not EPA registered) • profenofos (RUP) • terbufos (RUP, Class I) • triflumeron (not EPA registered)
Allowed (when registered) **Insecticide** AIs **proposed for registration** by ZEMA		
• *Bacillus thuringiensis*-BT • *Beauveria bassiana* • cyromazine (for use only in areas without high water table and sandy soil) • fipronil (registered in USA for use		

against termites, ticks, mites, fleas, ants, roaches and mole crickets) • lufenuron • malathion/mercaptothion • pyrethrins (Marigold extract) • spinosad • thiamethoxam (but only when plants are in vegetative state, not when flowering due to risk to pollinators and honeybee colony collapse disorder)		
Allowed Fungicide AIs registered by ZEMA		**Fungicide** AIs registered by ZEMA and considered but **Rejected for "Use" by USAID Projects**
• boscalid (nicobifen) • carbendazim • chlorothalonil • copper ammonium complex (acetate, carbonate) • copper (cuprous) oxide • copper oxychloride • copper sulfate • difenoconazole • fenamidone • folpet • fosetyl aluminum • kresoxim-methyl • mancozeb/maneb-zinc • phosphorous acid • propamocarb HCl • propiconazole • sodium metabisulfite • tebuconazole • thiram • triadimefon		• benomyl/benalate (not EPA registered) • iprovalicarb (not EPA registered) • propineb (not EPA registered)
Allowed (when registered) **Fungicide** AIs **proposed for registration** by ZEMA		**Fungicide** AIs proposed for registration by ZEMA, but **Rejected for "Use" by USAID Projects**
• copper hydroxide • cymoxanil • famoxadone • metalaxyl • triadimenol • *Trichoderma species* • pyraclostrobin		• alkyldimethylbenzyl ammonium chloride (not EPA registered) • dichlorophen (not EPA registered) • epoxiconazole (not EPA registered) • flusilazole (not EPA registered) • flutriafol (not EPA registered) • penconazole (not EPA registered)

Allowed Herbicide AIs registered by ZEMA		**Herbicide** AIs registered by ZEMA and considered but **Rejected for "Use" by USAID Projects**
• 2 4 DB acid • 2 4 D isooctyl ester • ametryne • bentazon • bromoxynil • clethodim • clomazone • dacthal/DCPA (for use only in areas without high water table and sandy soil) • diuron (for use only in areas without high water table and sandy soil) • fluazifop-p-butyl • fomesafen (use only acute toxicity Class II and III products; not Class I) • glyphosate • hydramethylnon • imazethapyr • mepiquat chloride • metolachlor/S-metolochlor (for use only in areas without high water table and sandy soil) • metribuzin • metsulfuron-methyl • nicosulfuron • pendimethalin • pyrothiobac-sodium • terbuthylazine		• acetochlor (RUP) • atrazine (RUP) • chlorimuron (ethyl) (not EPA registered) • paraquat (RUP) • propaquizafop (not EPA registered) • sulcotrione (not EPA registered)
Allowed (when registered) **Herbicide** AIs **proposed for registration** by ZEMA		**Herbicide** AIs proposed for registration by ZEMA, but **Rejected for "Use" by USAID Projects**
• bentazon • diuron (use only in areas without high water table and sandy soil) • fluometuron • halosulfuron (methyl) • linuron • mesotrione • MCPA • nicosulfuron (methyl) • oxyfluorfen		• cyanazine (not EPA registered)

• prometryn • propachlor (continued use without PPE could increase cancer risk) • propanil • quizalofop-p-tefuryl • thiobencarb(e)/benthiocarb • trifluralin		
Allowed Rodenticide AIs registered by ZEMA		**Rodenticide** AIs registered by ZEMA and considered but **Rejected for "Use" by USAID Projects**
• bromadiolone • difethialone		• coumatetralyl (not EPA registered)
Allowed (when registered) **Rodenticide** AI **proposed for registration** by ZEMA		
• zinc phosphide (only in concentrations of 2% and lower, which are EPA acute toxicity Class III)		
Allowed Nematicide AIs registered by ZEMA		**Nematicide** AIs registered by ZEMA and considered but **Rejected for "Use" by USAID Projects**
NONE		• fenamiphos (not EPA registered) • oxamyl (RUP, Class I) • terbufos (RUP, Class I)
Allowed (when registered) **Nematicide** AI **proposed for registration** by ZEMA		
• *Paecilomyces lilacinus* Strain 251 (attacks nematode eggs)		
Allowed Molluscicide AIs registered by ZEMA		**Molluscicide** AIs registered by ZEMA and considered but **Rejected for "Use" by USAID Projects**
NONE		NONE
Allowed Microbicide AI registered by ZEMA		**Microbicide** AI registered by ZEMA and considered but **Rejected for "Use" by USAID Projects**
• copper ammonium complex		• alkyldimethylbenzyl ammonium chloride (not EPA registered)
Allowed Bird Repellant AI registered by		

ZEMA		
• methyl-anthraniliate		
Allowed (when registered) **Nitrogen-Fixing Organism** AIs **proposed for registration** by ZEMA		
• *Rhizobium leguminosarum* • *Bradyrhizobium japonica*		
Allowed Wood Preservative Pesticide AIs registered by ZEMA		**Wood Preservative Pesticide** AIs registered by ZEMA and considered but **Rejected for "Use" by USAID Projects**
NONE		• chlorpyrifos-ethyl (no longer registered for this use by EPA)
Allowed (when registered) **Wood Preservative Pesticide** AI **proposed for registration** by ZEMA		**Wood Preservative Pesticide** AIs proposed for registration by ZEMA, but **Rejected for "Use" by USAID Projects**
• fipronil		• creosote (RUP)
Seed Treatment Products **Product Trade Name *Active Ingredient***		
• Medal SD *Imidacloprid70% WDG*		•

Annex B. USAID/AFR Bureau Fertilizer Fact Sheet

USAID
FROM THE AMERICAN PEOPLE

Version: June 2004

Download this factsheet at:
www.encapafrica.org/docs.htm#specificagriculture

AFRICA BUREAU FERTILIZER FACTSHEET

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CONTENTS

1. BACKGROUND

Low soil fertility is a problem throughout most of Sub-Saharan Africa (SSA). Moreover, the drastic reduction in fallow periods and the almost continuous cropping without soil fertility restoration has depleted the nutrient base of most soils. By the mid-late 1990s, all SSA countries were demonstrating a negative annual nutrient balance[1]. Countries that have the highest nutrient loss rates are the ones where fertilizer use is low and soil erosion is high. These areas include the East African highlands and a number of countries in West Africa.

Low soil fertility is also a driving force behind the conversion of natural areas for agricultural extension. It is generally accepted that agricultural intensification is the only viable means to conserve key natural areas while increasing food security for the continents growing population and generating economic growth through improved agricultural productivity. Land degradation undermines the ability of countries to move in this direction, and the loss of soil nutrients is the most important contributing factor to the land degradation process. The use of inorganic fertilizers is a critical part of the strategy to stop land degradation, restore soil fertility and better manage the soil resources that are fundamental for sustainable agricultural and economic development.

2. FERTILIZERS AND USAID ENVIRONMENTAL PROCEDURES

Fertilizers are frequently lumped together with pesticides under the generic heading of "agro- or agrichemicals." From an environmental compliance perspective (22 CFR 216), as well as from a field-level implementation point of view, this is inappropriate, because it implies that fertilizers require the same level of scrutiny reserved for pesticides. Whereas pesticides are subject to clearly defined environmental review procedures [22 CFR 216.3(b)(1)], and an approval process to promote safer use and integrated pest management, such procedures do not apply to fertilizers (procurement procedures do apply to quantity bulk purchase).

As with any technology, however, it is recommended that fertilizers be thoughtfully employed according to best practice, promoting integrated soil fertility management, within the context of the prevailing biophysical and socio-economic conditions, as well as the desired outcomes. This fact sheet was developed to assist in that regard.

3. IMPORTANCE OF WATER MANAGEMENT TO NUTRIENT UPTAKE

Proper water management is important for maximizing crop use of nutrients. About 97% of crop nutrient uptake is from soil solution (water-soluble nutrients), which makes water by far the most important nutrient or fertilizer delivery medium. This also means that, for the most part, nutrient mobility is directly linked to water movement. In sandy soils, nutrients move more quickly through the root zone and soil profile than in other soil types, and excessive water application (or heavy rainfall) can lead to nutrient loss through leaching. Run-off is most serious on loamy-sands or sandy loams that often have a strong surface crust formation. In heavier soils (clays), if nutrients are not adequately incorporated into the soil, the chances for surface runoff in the event of heavy rains or over-irrigation are increased. Sound water management is especially important in rainfed conditions (common throughout SSA). Overall, good water management leads to a more efficient

use of fertilizers and increased nutrient uptake and vice versa.

4. GENERAL SOIL FERTILITY TRENDS IN AFRICA

- Farmers who have taken measures to conserve moisture or increase soil organic matter are more likely to use inorganic fertilizer. When farmers in some areas have capital, they often invest first in increasing moisture retention and/or increasing soil organic matter and secondly in inorganic fertilizer.
- Farmers increase their use of fertilizer when investing more money in fertilizer is seen to be the best available option.

  This increase may result from changes in any of the following: fertilizer price, crop price, fertilizer availability, water availability, seed availability, knowledge about fertilizer use, or cropping pattern.
- In West Africa, integrated soil fertility management is progressively adopted. It concerns the combined use of soil amendments and inorganic fertilizer, leading in time to improved soil fertility and increased fertilizer use efficiency and profitability. The nutrient losses to the environment are decreasing.
- Given past and current use rates, USAID's fertilizer-related activities in Africa are unlikely to cause environmental problems.

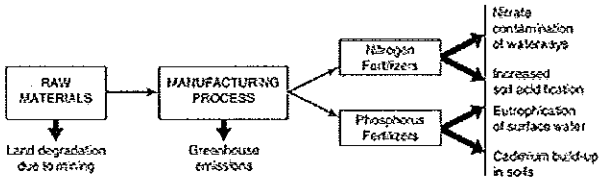
5. FERTILIZER APPLICATION GUIDELINES

- Before applying fertilizers, obtain an assessment of soil conditions (fertility).
- Indiscriminate use of chemical fertilizers should be avoided.
- Different kinds of fertilizers are required in order to maintain a given level of soil fertility. This depends on site-specific factors, including the soil type, the nutrient requirement of the crop and the various sources of available nutrients. Nitrogen and Phosphorous are the most important nutrients lacking in SSA soils.
- Fertilizer application has to be considered in the context of the overall farming system. This includes the use of organic manure and residues, soil cultivation and crop rotation and water harvesting. Collectively, these factors influence the efficiency of nutrient use.
- When fertilizers are used, it is very important to apply the correct amount for the given situation. The challenge to the farmer is to match as closely as possible the input of nutrients to the nutrient uptake of the crop, thereby minimizing losses. Over fertilization is both costly (wasteful) and potentially harmful to the environment. To apply the correct amount, the farmer has to define his production goal.

6. POTENTIAL NEGATIVE ENVIRONMENTAL EFFECTS OF FERTILIZERS

Excessive application of nutrients over time can cause pollution. Such losses may occur when nutrients run off the land caused by heavy rainfall, are leached through the soil, beyond the root zone, eventually reaching the groundwater, or escape into the atmosphere as volatile gases.

Aspects of environmental impact can be illustrated as follows:



(Taken from Incitec Fertilizers)

NITROGEN FERTILIZERS

Inorganic nitrogen fertilizers are readily converted by soil organisms to nitrate in the soil. The nitrogen in soil organic matter and organic fertilizers becomes available more slowly. Nitrates may be readily leached if not used by crops or other vegetation. Leaching is particularly likely in sandy soils following heavy rainfall. Leached nitrates may contaminate underground water. This is of concern if the water is to be used for human or livestock consumption, as high concentrations of nitrate may affect health.

Nitrogen fertilizers can also accelerate the natural process of soil acidification. Some fertilizers (e.g. anhydrous ammonia and urea) may initially raise the soil pH at the site of application but in the long term acidify the soils. This occurs when ammonium is converted to nitrate. Acid produced in the nitrification process is used if the nitrate is taken up by plants or soil organisms, but if the nitrate is leached beyond the root zone, acidification occurs. Soil acidification reduces the availability of the trace element molybdenum, fosters the development of aluminum, iron and manganese toxicity and increases nodulation failure in legumes. Lime may be required where acidity is a problem (obtained from naturally occurring calcium carbonate) or the use of acid tolerant plant species can be considered. An illustrative list of crops with acid tolerant varieties include: rice, cassava, mango, cashew, citrus, pineapple and cowpeas.

PHOSPHORUS FERTILIZERS

Excess amounts of phosphorus have been associated with algal blooms and the eutrophication of lakes and waterways. In most waters, phosphorous functions as a growth-limiting factor because it is usually present in very low concentrations. Algae only require small amounts of phosphorous to live. Excessive phosphorus over-stimulates the growth of algae, which could deplete the water of the

dissolved oxygen that is vital to other aquatic life. Phosphorus is relatively immobile in the soil, so conservation and cultural practices which reduce soil erosion can significantly reduce phosphorus inputs into water bodies and the water table.

Phosphorus fertilizers contain various impurities from the phosphate rock and acid used in manufacturing the fertilizer. Cadmium increases is the greatest concern as its compounds are toxic to human beings. Cadmium increases are most noticeable in certain crops e.g. potatoes and leafy vegetables (lettuce and spinach) and in the organs (kidneys and liver) of animals. Almost all phosphate fertilizers contain traces of cadmium, and the concentration of cadmium varies considerably from source to source. At this time, there are efforts underway in West Africa to develop viable processes to remove cadmium from phosphate rock. Exports of rock phosphate represent a vital source of revenue for a number of developing countries in Africa.

FERTILIZER EFFECTS ON SOIL BIOLOGY

Good soil consists of 93% mineral and 7% bio-organic substances. The bio-organic parts are humus (85%), roots (10%) and soil organisms (5%). Most of the soil organisms are decomposers (bacteria and fungi), which are responsible for nutrient retention in soil. In order for nutrients to become available they must be mineralized by the interaction of decomposers and organisms that feed on the decomposers (protozoa, nematodes, micorarthropods and earthworms). Plant growth is dependent on microbial nutrient immobilization. When the number of decomposers declines in soils, more nutrients are lost into the ground and surface water. Heavy treatments of chemical fertilizers can kill decomposers and other soil organisms, which will lead to a reduction in nutrient retention and possible surface and ground water contamination.

7. A SUMMARY OF BEST MANAGEMENT PRACTICES FOR SOIL FERTILITY AND HEALTH

- Practice Integrated Soil Fertility Management (ISFM) – the use of both organic and inorganic sources of nutrients rather than either alone;
- Use of legume cover crops (plus phosphorous) and green manures by fallow rotation or intercropping;
- Promote agroforestry practices – in addition to soil conservation and production benefits, agroforestry transfers/cycles nutrients from within the soil profile (deeper levels to surface);
- Use conservation tillage rather than deep plowing (although conservation tillage can be harmful for production systems in certain regions[2]);
- Use farm site manures and household wastes, with or without composting;
- Choose crops and associated plants that have high nutrient use efficiency.

6. ADDITIONAL READING

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