

Template for Environmental and Social Safeguards Management in NAIP*

Project title: Development of Biosensors and micro-techniques for analysis of pesticide residues, aflatoxin, heavy metals and bacterial contamination in milk

1. Basic information

A. Project Data

Project Statistics:

Total Cost: Rs. 729.8874 lakh

Duration: Four years and three months

Location: Goa, Karnal, Delhi and Patiala

- **Consortium Leader** : Birla Institute Of Technology And Science, Pilani, Goa Campus
- **Consortium Partners:** National Dairy Research Institute, Karnal
: IIT, Delhi
: Punjabi University, Patiala

- **Consortium PI:** Dr. Sunil Bhand

- **Consortium CoPI:** Dr. Naresh Kumar
: Prof. Sudhir Chandra
: Dr. Neelam Verma

- **Project Objectives**
 - I. To develop micro-array based multianalyte biosensor systems for analysis of pesticide residues, aflatoxin M1, heavy metals Cd (II) and Pb (II) and bacteria in milk, based on Enzymes, Antibodies, Bacterial spores and Molecularly imprinted polymers (MIPs).

 - II. Develop a field portable Micro fluidic flow injection analysis (μ -FIA) biochip system for the analysis of pesticide residues, heavy metals, aflatoxin M1 in online process monitoring.

 - III. A nano-biosensor based on nanoparticles and novel piezoelectric materials will be explored for separation and simultaneous detection of extremely low concentrations of analytes.

- **Brief Project Description**

- (1) To develop techniques for high sensitivity detection and simultaneous multianalyte analysis of pesticide residues (different classes and types) and aflatoxin M1 (in few ng/L), heavy metals Pb(II) and Cd(II) and bacterial contamination in milk.
- (2) Novel electronic materials development to achieve improvised OPTICAL and ELECTRICAL properties to facilitate sensitive signal transduction in Bio- Micro Electromechanical Systems ‘Bio-MEMS’ (e.g. **ZnO thin films**). Challenge is to miniaturize both the biochemical assays as well as the device. **in Bio-MEMS based sensing devices.**
- (3) To make an attempt to substitute the natural antibodies and enzymes with molecularly imprinted polymers (MIPs) also termed as synthetic receptors. The antibodies and the active site of the enzyme will be mimicked in a polymer template to create artificial receptors/active sites. This might provide a bio-free greener biosensing technique of the futuristic applications.
- (4) An innovative micro-flow injection analysis (**μ-FIA**) **setup** development for online monitoring of pesticide residues and aflatoxin M1 in milk. Simultaneously a flow through surface plasmon resonance (SPR) detection utilizing the bio-functionalized magnetic nanoparticle will be tested for ultra trace separation and detection on an experimental basis.
- (5) Using microbial spore as Nano-detectors, a bio-chip platform for analysis of different type of bacterial contaminants in milk (based on substrate specificity of germinogenic substrate from spores) will be addressed.

B. Environmental Category

2. Major issues in the subproject

- Social:
This is project addresses basic science problems within the confines of laboratory, so the implementation of the project does not have any social issues.
- Environmental:
As mentioned above, all activities of this project will be within the confines of laboratory, so impact on the environment is expected. On the other hand the project aims at developing environmental friendly greener techniques.

3. Safeguard Policies Triggered (World Bank Policies)

Safeguard Policies Triggered (World Bank Policies)		
	Yes	No
Environmental Assessment (OP/BP 4.01)	[]	[X]
Natural Habitats (OP/BP 4.04)	[]	[X]

Pest Management (OP 4.09)	[]	[X]
Cultural Property (draft OP 4.11-OPN 11.03 -)	[]	[X]
Involuntary Resettlement (OP/BP 4.12)	[]	[X]
Indigenous Peoples (OD 4.20)	[]	[X]
Forests (OP/BP 4.36)	[]	[X]
Safety of Dams (OP/BP 4.37)	[]	[X]
Projects in Disputed Areas (OP/BP 7.60)	[]	[X]
Projects on International Waterways (OP/BP 7.50)	[]	[X]

4. Risk related Issues (not covered under 3 above but perceived to be important in the sub project)

NO ISSUES

Impact Assessment (Enclosure –I and II)

Provided in Enclosures I and II

5. Potential indirect and / or long-term Impacts due to anticipated future activities in the project areas (assessment of anticipated conflict / complimentarity with the current as well as those proposed for the next five years) in the areas of activities of the sub-Project)

Not applicable.

6. Identify the key stakeholders and describe mechanisms for consultation with and to them done / disclosure so far done including pre-project consultations with the stake holders, stakeholders' workshop before formulating the full proposal, discussing the full proposal with some stakeholders before submission to the PIU

Stakeholders in this project are scientists. Mechanisms for consultation with them will be through annual workshops, frequent consultation through emails and telephone. Pre-project consultation has been already carried out through a meeting of all consortium partners, which was then followed by a stakeholders' workshop on September 3-4, 2007.

7. Consultation / disclosures to be done in future : Local disclosure through mechanisms such as launch workshop, interfaces during the implementation stage of the sub-project for sharing the results and soliciting feedback, circulating project brochures and implementation progress from

time to time, putting up annual reports on the web site and annual stakeholder workshops wherever feasible

* To be submitted as a separate Annexure along with full project proposal for review



Consortia PI

National Coordinator

National Director

Safeguards Template for NAIP Projects

A: Environmental Safeguard : Activities, Issues, Impact and Mitigation Measures				
Table 1: Environmental Safeguard : Activities, Issues, Impact and mitigation Measures				
Activities¹	Issues²	Anticipated level of Impacts³		Mitigation Measures (Negative Impact)⁴
		Positive	Negative	
-	None	No	No	Not applicable

- 1. List the activities/interventions proposed in the project. An indicative list of main activities is provided in the list of possible issues (please add/delete as suits your sub-project)**
- 2. List of possible issues under different sectors is provided in List I. Fine tune it according to the project interventions/activities**
- 3. Provide quantitative indication of the issue at the beginning of the project on the basis of studies, collective wisdom etc.State the likely impact (Positive or Negative) of activities/interventions on the level of issues identified. Put in a scale of 0-5 (very low , low, moderate, high, very high). Brief statements can also be made.**
- 4. State the mitigation measures planned to be taken to address the negative impact**

B. Social Safeguard : Activities, Issues, Impact and mitigation Measures

Table 2 : Social Safeguard : Activities,Issues, Impact and mitigation Measures

Activities¹	Issues²	Anticipated level of Impacts³		Mitigation Measures (Negative Impact) ⁴
		Positive	Negative	
NO ISSUES				

- 1. List the activities/interventions proposed in the project. An indicative list of main activities is provided in List II**
- 2. List of possible issues under different sectors is provided in Annex-3. Fine tune it according to the project interventions/activities**
- 3. Provide quantitative indication of the issue at the beginning of the project on the basis of studies, collective wisdom etc.State the likely impact (Positive or Negetative) of activities/interventions on the level of issues identified. Put in a scale of 0-5 (very low , low, moderate, high, very high). Brief statements can also be made.**
- 4. State the mitigation measures planned to be taken to address the negative impact**

Some Main Type of activities/Interventions
Use of high yielding varieties, chemical fertilizers, pesticides use of high value crops
Crop diversification
Development of irrigatio system, water harvesting
Farm mechanization
Harvesting and sorage of agriculture produce
Transporation and processing of agricultue produce
Packaging and marketing
Research involving potentially harmful chemicals/biochemicals/radicoactivity
Research involving microganisra/viruses
Research involving GMOs
Research involving in vivo activities with animals

List I

List of Possible Environmental Issues
1. Land
Carrying capacity of land
Soil erosion
Salinity and alkalinity
Loss of soil nutrients
Degradation of soil biological status
Loss of soil water holding capacity
Soil water logging
Soil contamination/ pollution
Heavy metals
Pesticides and others
Harmful chemicals
Misuse of chemical fertilizer
Bio-wastes and non-degradable products
Effects of change in cropping pattern on
Soil
Water
Environment
Increase in agricultural wastes
Effect on beneficial
Flora
Fauna
Loss of forests/ vegetation cover

Development of resistance in pests (Insects, weeds, microbes)
Effect on agrobiodiversity
Horticulture/Crop Plant
Livestock
Fish
Other aquatic resources
Effect on general-biodiversity
Plants
Animal
Microbes
2. Water
Effects on availability water resources
Water quality for irrigation
Water quality for drinking
3. Air Quality
Pollutants
Green house gases
4. Human Health
Through the food chain
Through soil / water/air/wastes

List II

List of Possible Social Issues
Agriculture
Vulnerability to economic loss
Greater competition for natural resources (land, water, forests, fodder)
Change in Landuse affecting long term profitability of land
Loss of land to non-agricultural use
Change in income patterns
Unbalanced displacement of food crops by cash crops affecting food & nutritional security
Fodder/grazing area shortage- loss of commons
Community
Unequal access to inputs
Marginlisation and increasing disparities
Increased poverty and indebtedness
More dependence on external resources
Increased drudgery for women
Effect on child care/health
Change in occupational patterns
Increased incidence of diseases
Health and safety hazards
Effect on community ownership of natural resources and intellectual property
In-migration
Out-migration

Unemployment
Increased role of middlemen/contractors
Increase pressure on local infrastructure
Cultural impacts
Gender discrimination
Social conflicts
Increased risk of encroachment
Risk of life
Effect on international relations/agreements etc (if any)