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# Environmental Impact Assessment of Agro Products in Nanded District of Maharashtra

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## ABSTRACT

*Environmental Impact Assessment (EIA) is a widely used tool to evaluate the potential impact of any given activity on the environment. The present work mainly evolves around the most developed agro-product and industry, the developing agro-product and industry and the potential for development agro-product and industry of Nanded district of Maharashtra. The study tries to investigate the environmental impact of these economical activities. Three basic components (use of fertilizers, pesticides, and safe disposal of wastes) of these activities have been selected to study their environmental impact and risk. Although the study has revealed that there is environmental risk in the study area pertaining to these economic activities however the study also works to provide Environmental risk management techniques for the environment as a whole.*

**Keywords:** Environmental Impact Assessment, chemical fertilizers, Bio-pesticide, synthetic neurotoxins, *Fertigation*.

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## INTRODUCTION

Environmental Impact Assessment (EIA) is a widely used tool to evaluate the potential impact of any given activity on the environment (Hoanh, 2006). The potential environmental impacts of projects/ programmes can be numerous and affect different aspects of the environment, such as soil erosion or water quality.

Use of agricultural biodiversity for national socio-economic development as well as for food security, nutrition and livelihoods is important as is important to protect the environment.

Three different types of agricultural products & agro-based industries have been selected for the study region on the basis of developed industry, developing & potential for development

industry. The region has a *developed* oil industrial base with a variety of oil mills. The Floriculture industry is new but very rapidly *developing*. The region has every *potentiality to develop* itself as an Ayurvedic medicinal base.

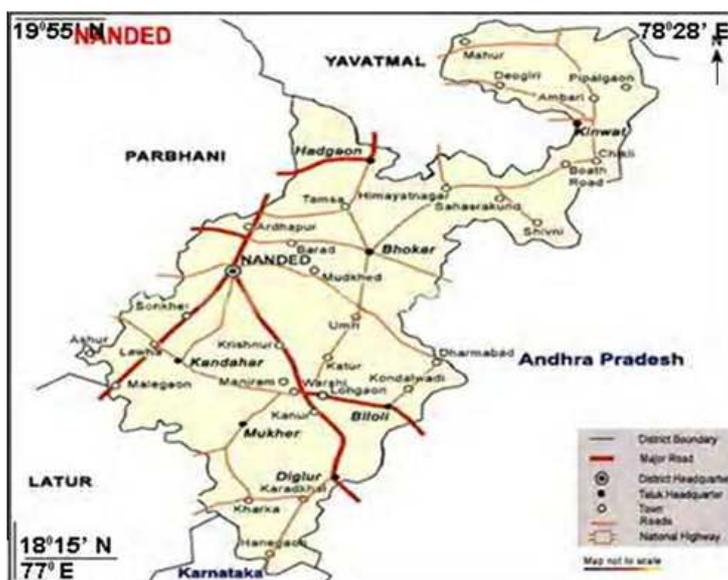
#### OBJECTIVE:

1. Environmental Impact Assessment of fertilizer with respect to selected agriculture in the study area.
2. Environmental Impact Assessment of pesticide with respect to selected agriculture in the study area.
3. Environmental Impact Assessment of waste disposal with respect to selected industries in the study area.
4. Find out environment friendly ways to combat the ill effects of the selected attributes in the region.

#### Study Area

The district of Nanded lies at the border of Maharashtra. The study area (Fig 1) is bounded by 18°15' to 19°55' North latitude and 77° to 78°25' East longitudes. The total area is 10,332 sq km (3.41 % of the state).

Figure 1: Location map of Nanded



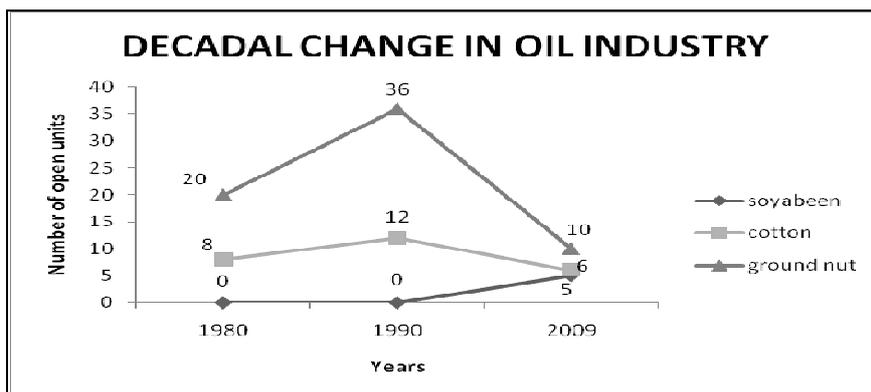
#### RESULTS AND DISCUSSION

The present work mainly evolves around Oil seed cultivation & oil industry, floriculture & medicinal plants cultivation & medicinal industry. The study tries to investigate the environmental impact of these economical activities. Under Environmental impact assessment three basic components have been taken under oil seed cultivation, medicinal plants cultivation, floriculture & their respective industries. The components are- risks in *use of fertilizers, pesticides, and safe disposal of wastes* pertaining to the three agro-products.

#### 4.1 Oil seed cultivation:

India's agriculture & economic ministries show that Maharashtra is emerging as an important Soya been producer replacing ground nut (Brototi et al, 2008). The number of solvent plants in the study area has risen tremendously in the past 5 years which has raised the question of environmental issues (Fig 2).

Figure 2: Decadal Change in oil Industry



##### 4.1.1 Problems arising due to Fertilizers:

Oil seed cultivation in the study area is done with a heavy application of chemical fertilizers (NPK) in varied proportion depending on the type of oil seed taken. Overdose of nutrients causes soil degradation, enhances the soil acidity & increases chances of ground-water contamination. Excess Nitrates cause eutrophication of water bodies. Excess  $N_2$  also damages the top soil making it more acidic. Case studies of 25 farmers were done using chemical fertilizers and 25 farmers using organic farming. Over a period of 5 years the soil pH of the former reduced by 0.75, however the soil maintained its pH for the latter. Soya bean cultivation is new in the study area. However in areas where Soya bean cultivation has been done continuously for 7-8 years the problem of depleting nutrient in the soil has been observed to the extent of total nutrient loss from the topsoil. The agricultural scientists of Agricultural School, Nanded undertook Soya bean cultivation on a  $2/4^{\text{th}}$  acre of land and the above observation was made.

##### 4.1.2 Combating the problem:

The farmers in their quest to obtain more profit generally apply overdose of chemical fertilizers. The farmers instead should go for soil testing regularly & only those nutrients in correct proportion should be applied which the soil is lacking. Instead of using 100% chemical fertilizers, farmers nowadays are also using organic farming, compost & bio-fertilizers with chemical fertilizers (Brototi et al, 2011[1]). Neem cake is an excellent substitute for chemical fertilizers, although the farmers in the study area are not aware of this (Brototi et al, 2011 [2]).

To understand the impact of Neem fertilizer a small experiment was done. A 2 Hectare agricultural field was chosen for the survey, Field A & B. The site is located at latitude  $19^{\circ} 07' 45''N$  and longitude  $77^{\circ} 19' 08'' E$  at 354 m above mean sea level. 60 trees were randomly planted in July 2003 in 1 ha (B). Both the fields were sown with crops (cotton). From 2005 onwards every year the leaf litters were scattered in the agricultural field B. Each year regular soil testing was done. Soil fertility depends on the correct proportion of soil nutrients (NPK),

humus, organic matter etc. Neem litters enhance the basic compositions of soil. After 4 years, in 2010, the top soil had an increase in NPK content to the extent of N -22-25 kg/ ha, P- 2.52 kg/ ha & K -15.8 kg/ ha. Thus there was a steady reduction in application of NPK in the soil in Field B while for Field A, it required external chemical fertilizer input. The result is shown in Table 1. Thus the basic nutrient of the soil being enhanced together with increased organic matter, obviously the soil fertility also improved.

**Table 1: Reduction in NPK application in Field B as compared to Field A**

	NITROGEN application to soil in Kg/ha				PHOSPHORUS application to soil in Kg/ha				POTASSIUM application to soil in Kg/ha			
	2006-07	07-08	08-09	09-10	06-07	07-08	08-09	09-10	06-07	07-08	08-09	09-10
<b>Field A</b>	100	100	100	100	50	50	50	50	60	60	60	60
<b>Field B</b>	100	92	85	75	50	50	47	48	60	58	50	45

Source: Based on field survey

Through natural (organic) soil fertility increase, we could do away with the ill-effects of chemical fertilizer and there was no compromise with the productivity of the soil, which in fact in comparison to Field A increased satisfactorily.

#### 4.1.3 Problems arising due to Pesticides and solution to the problem

There is a healthy application (overdose) of pesticide during the growth of oil-seeds. Much of this has a wasting effect on the environment. These are entering the human body cycle with the oil seeds & animal body cycle with the de-oiled cakes. A survey among 15 farmers undertaking mixed farming with at least 5 acres of land was done with respect to negative effect on cattle and human (shown in Table 2).

**Table 2: Effect of Pesticides on Human & Cattle in Nanded district**

Name of Pesticides	Toxic element	Effect on Human	Effect on Cattle
DDT	Organochlorine	Asthma, Allergy, Eczema, Vomitting, Dysentry	Muscle tremors, High temperatures, Low Milch, toxin entering the milk
Endosulfan			

Source: Based on field survey

The answer to this problem is Bio-pesticide, mainly application of *Bacillus Thuringiensis* & *Bacillus Popilliae*. In fact the *Bacillus Thuringiensis* variety of cotton is used by the farmers of this region (Udyojak, 2008). Further Neem based pesticides is an effective answer to chemical fertilizer (Panhwar, 2005). *Bacillus Thuringiensis* on entering the food cycle of grazing animals have a positive effect in enhancing protein content. The evidence to date suggests that insecticides derived from the Neem tree are unlikely to cause substantial environmental damage and these products appear to be safer than synthetic neurotoxins (Stark, 2004).

#### 4.1.4 Waste disposal

The waste in oil seed industry is in the form of de-oiled cake, which is used as cattle feed. Cotton industry has another byproduct- *Maddhi*, which is used up by the soap industry (Udyojak, 2008). However, Solvent plants produce a lot of wastes in the form of sludge and other solid waste which include spent acids from chemical refining of crude oil, spent bleaching earth containing gums, metals, pigments, deodorizer distillate from the steam distillation, mucilage from degumming and spent catalysts and filtering aid from the hardening process. A part of the contaminated and uncontaminated waste is used up by the brick industry. In the study area the

useless liquid waste is directly disposed off in pits and into the river Godavari increasing the chances of ground water, soil and water contamination. Nanded's total amount of contaminated partial treated waste disposed off in pits and Godavari river is around 12 tonnes/ annum. The highly *toxic* element in the waste is *Cadmium* and *Mercury* which on entering the vital organs of fishes of Godavari (*Macronus Vittatus*, *Chana Gaucha*, *Aerous Dussemurri*) eventually enters human body. In *Tuppa region* of Godavari where the wastes make way to the river, several cases of skin problems like itchinness, allergy, acute hair loss, loss of appetite, kidney problem and eye problem was seen.

#### 4.1.5 *Combating the problem:*

The main problem posed to the environment is through the solvent plants. There are various technological & scientific approaches to combat with the problem ([http://www.epa.gov/ttn/ecas/regdata/IPs/Vegetable%20Oil\\_IP.pdf](http://www.epa.gov/ttn/ecas/regdata/IPs/Vegetable%20Oil_IP.pdf)), although these are not adopted in the district.

1. Dispose of contaminated sludge from wastewater treatment at a sanitary landfill or by incineration.
2. Use uncontaminated sludge and effluent from on-site wastewater treatment as fertilizer in agricultural applications.
- 3 Use emulsion breaking techniques, (e.g. dissolved air flotation [DAF]), to segregate high BOD and COD oils from wastewater.

#### 4.2 Floriculture:

About 1160000 ha area is under Floriculture at present in India (Kusumita, 2010). In Nanded the total land under floriculture is 15.20 ha. Due to the growth of the industry in the study area as well as in India in general, the environmental concerns of this industry is growing.

##### 4.2.1 *Problems arising due to Fertilizers:*

Floriculture requires Nitrates of Calcium & Potassium nitrate, sulphate of Magnesium, Manganese, Potassium, Zinc, Copper & Borax in various proportions. Generally chemical fertilizers are the only ready solution for the study area. However the ill effects of the same is in the form of Soil & water quality degradation, cattle health effects, salinization etc.

##### 4.2.2 *Combating the problem:*

Maharashtra Flower Grower's Association along with the district's Flower Grower's Association has found out more scientific & environmental approach to combat with the problem. The Green house flower growers of the district have started undertaking the following type of fertilization.

1. Fertilizer requirement in the form of both chemical & organic fertilizer in the ratio of 60:40 is applied instead of only chemical fertilizers.
2. Regular soil testing is done to understand the requirement of soil & only those nutrients which are lacking and useful for the plant are added instead of adding all the nutrients.
3. Bio-fertilizers as well as Potassium, sodium, & nitrification bacteria are used to keep the soil healthy & enhance the longevity of the soil.
4. *Fertigation* is a new technology in which readily water soluble fertilizers are used.
5. Green manuring & organic compost are also used.

#### 4.2.3 *Problems arising due to Pesticides*

A huge amount of pesticides is used in this industry. Still now in India the concept of Bio-pesticide is new. Pesticides (which include herbicides, insecticides, fungicides and more) can contaminate organisms, soil, water, turf, and other vegetation. It is estimated that less than 0.1 percent of the applied pesticide reaches the target pest, leaving 99.9 percent as a pollutant in the environment, including the soil, air, and water, or on nearby vegetation (Pimentel, 1995).

#### 4.2.4 *Combating the problem:*

Various plant extracts (Neem pesticide), organic molecules, soil bacteria, soil virus & soil fungus can be effectively used to combat the problem arising due to chemical fertilizers. The following bacteria, virus & fungus can be effectively used as soil pesticides.

**Bacteria-** *Bacillus thuringiensis*, *Bacillus popilliae*. Bt produces a crystal protein that is toxic... to attack a broader spectrum of pest (Mathews 2000, Walnwright, 1999).

**Virus-** Heliothis (NPV), Pinesawfily (NPV) (Hall, 1998)

**Fungus-** *Metarhizium anisopliae*. The fungi grow... weakening them (Burges, 2000, Kaushik, 2009) .

However this type of bio-pesticide is still in its infant stage in India.

#### 4.2.5 *Waste disposal*

This is not a problem for the floriculture industry, since there is very little waste. The waste is utilized as compost.

### 4.3 **Medicinal Plants cultivation:**

The district has a plethora of wild growing medicinal plants (Sharma et al, 1996). The district has commercial cultivation of Aloe-Vera & Awla.

#### 4.3.1 *Chemical Fertilizers in medicinal industry:*

Cultivation of medicinal plants does not require any heavy chemical fertilization. Aloe-Vera & Awla requires organic compost & green manuring. This reduces contamination due to excessive chemical fertilizers.

#### 4.3.2 *Pesticides in medicinal industry:*

There is no heavy requirement of pesticides in the medicinal plants. Medicinal plants are generally self protective.

#### 4.3.3 *Waste disposal:*

Medicinal industry does not use any heavy chemicals, so the waste is not hazardous. Further more the waste is also useful. The twigs of Awla can be recycled into pesticide formation (Panhwar, 2005).

For Aloe-Vera, the waste is pulp & leave extract, which is used in compost formation.

## CONCLUSION

1. The study area is more accustomed to Chemical fertilizer in overdoses which obviously have a wasting effect on human & the grazing animals.
2. There is a negative impact on the environment, human & animals of the study area due to the chemical pesticides.
3. The problem of waste disposal is severe for the oil mills, especially for Solvent plants, since the contaminated sludge is directed into the ground raising environmental risks.
4. There are a lot of environ-friendly ways to combat the ill effects of the selected attributes in the study area, which includes bio-fertilizers, bio-pesticides, incineration, effective usage of uncontaminated sludge etc.

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