STRATEGIC ENVIRONMENTAL ASSESSMENT OF AGRICULTURAL POLICIES IN PAKISTAN

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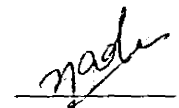

Nadia Akhtar

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IN THE NAME OF ALLAH, THE MOST MERCIFUL AND BENEFICIENT

DEDICATION

This research work is dedicated to my husband (ArifHameed), my parents, in laws, and my kids (Aamna and Abdullah)

LIST OF ABBREVIATIONS

Acronyms	Abbreviation
ADB	Asian Development Bank
EE	Environmental Evaluation
EIA	Environmental Impact Assessment
EU	European Union
GHG	Greenhouse Gases
GoP	Government of Pakistan
IUCN	International Union for Conservation of Nature & Natural Resources
MDG	Millennium Development Goals
MTDF	Medium Term Development Framework
NAP	National Agricultural Policy (2009-10)
NEP	National Environment Policy
NIAP	National Impact Assessment Programme
NMTPF	National Medium Term Priority Framework
NSDS	National Sustainable Development Strategy
OECD	Organization for Economic Cooperation & Development
PEPA	Pakistan Environmental Protection Act
PPP	Policy, Plan, Program
SEA	Strategic Environmental Assessment
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
WB	World Bank

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ABSTRACT

Strategic Environmental Assessment (SEA) has emerged as an important tool for integrating environment into strategic decision making process worldwide.Agriculture is among one of the sectors where there is a dire need of integrating environmental concerns for its sustainable development through strategic planning. This sector is known to have significant contribution in environmental problems and can be highly influenced by policy.In case of Pakistan, this need has increased many foldsafter 18th amendment in constitution with which agriculture sectors has become provincial responsibility while sharing its mission of food security with federal Ministry of Food Security and Research w.e.f 25th June, 2011.

The present study aimed at reviewing existing agricultural policies in Pakistan for identifying gaps and deficiencies in the context of environment and sustainability. The study was based primarily on critical review of the National Agriculture Policy (NAP)(2009-10). Study was carried out by gathering qualitative as well as quantitative data against agriculture and environmental performance indicatorsfor the policy. Based on the baseline conditions and environmental objectives set under National Environmental Policy (2005), SEA objectives were set and compared with actions proposed underNAP (2009-10) to identify positive and negative impacts on environment and gaps that need to be addressed in future policies.

Results showed that with respect to actions proposed under NAP 2009-10, positive impacts are expected from actions that are related to land resources management, integrated water resource management, consumer awareness and capacity building on safety, protection and environment, climate change adaptation and assessment of risk vulnerabilities. However, effectiveness of these policy measures is linked with the effective planning, monitoring and auditing. Capacity building of the existing institutions will be a prerequisite to achieve these goals. Negative impacts are expected from the actions that are inclined towards corporate farming and targets to convert subsistence to commercial farming. Such trends may result is shifting of farmers to high value crops. The identified gaps are mainly related to utilizing potential of agriculture residue for energy production, climate change mitigation, disaster risk management, diffuse pollution, establishment and coordination of provincial department, harmonization in policy/regulation of all provinces.

Chapter1

INTRODUCTION

1. Introduction

1.1 General

The quality of policy and planning process affects the success of development and play a major role in the overall progress of a country inlong-term. Poor people residing in third world countries suffers from the consequences of poor policy, planning or investment decisions which destabilize development process and consequently lead to resource degradation (OECD, 2012). Integration of environmental considerations in sectoralpolicies and their implementation in respective development plans, programmes and projects is a key to sustainable development (Lee, 2006). Although worldwide, governments have begun to make substantial changes in the institutional structures to allow systematic consideration of the environment in traditional government setups, however, procedures for addressing cross-sectoral and inter-generational issues often display a deficit of coherence and integration. Constitutional, legal, and political obstacles are maintained for clear distribution of responsibilities and specialization of tasks among various sectors. Segmented work methods coupled with lack of coordination between sectors are major obstacles to achieve sustainable development (OECD, 2002). Major distortions come from differential perspective of stakeholders and incompatibility of interests which provide hindrance in achieving a level of trade off in policy making.

Need for integration of environment in decision making has also been agreed at internationalforums in various conventions and conferences including Brudntland Commission Report, 1987, Rio Declaration, 1992, Millennium Development Goals (MDGs), 2000 and World Summit on Sustainable Development (WSSD) 2002. Particularly the 7th MDG on environmental sustainability ensure that principles of sustainable development become an integral part of all policies and programmes. The OECD (2002) recognized that commitment of coherence in policies is one of the vital elements of sustainable development. An adjustment or a fundamental reshaping of decision-making process, in the light of country-specific conditions, will be necessary if environment and development is to be put at

the center of economic and political decision-making in effect for achieving integration of these factors. In this regard, Strategic Environmental Assessment (SEA) has been recognized as an important tool for integrating environment into strategic decision making process worldwide (Sheate*et al.*, 2003; Sadler and Verheem, 1996; Partdario, 1996).

Agriculture is among one of the sectors where there is a dire need of integrating environmental concerns for its sustainable development through strategic planning. This sector is known to have significant contribution in environmental problems and can be highly influenced by policy (Tzilivakis*et al.,* 1999). However; agriculture has not remained the focus of SEA application worldwide unlike transportation, energy and industrial development. Agriculture sector is the life line of the economy of most of the developing countries and most crucial to the development. However, integrated vision is often lacking in this sector mainly due to its multi-sectoral linkages like water, land use planning, chemical inputs, food security and agribusiness development etc. However sustainable development of this sector is required to provide food security and agro-base industrial development to avoid widespread environmental as well as socio-economic impacts associated with this sector.

Environmental and social considerations have not always been central to the national and sectoral policies particularly in developing countries. Inadequate planning capacity may result in policies lacking strategic perspective with regards to the integration of the overall national objectives and goals; in worst cases, the achievement of one cluster of sectoral goals can compromise the accomplishment of goals of other sectors. Conducting SEA is designed to assist governments in anticipating the environmental impacts ofdevelopment plans and policies implementation. SEA is being used as a tool to ensure that environmental considerations are integrated into policies, plans and programmes for better development outcomes.

Agriculture sector has a significant contribution in Pakistan's GDP, thus agriculture policies are crucial to be assessed strategically for environment and sustainable development. Therefore, the need of conducting SEA of policy and plans of agriculture as one of the major economic sectors has become twofold after 18th constitutional amendment, which has resulted in devolution of functions and responsibilities of ministries of agriculture, health, education and environment to provinces to legislate and develop their policies on such subjects but the progress remained limited. In this study an effort has been made to strategically assess the impacts of implementation measures proposed in draft Agriculture

Policy of 2009-10 as this draft is being used by the provinces as baseline document for development of agriculture policy at provincial level.

Present study is a pioneering effort for strategically assessing the environmental impacts of agricultural policies and plans in Pakistan. It is hoped that the findings of this study will be useful for provinces for policy formulation in agriculture sector. Moreover, this study will stimulate the studies of similar nature in Pakistan. Chapter 1 gives the introduction and background of SEA with reference to agriculture sector and chapter 2 provides the details of thereviewed literature for this study, whereas chapter 3 describes the methodology used for the analysis of the secondary data collected for this study. The analysis of findings as results of this study are discussed in chapter 4 and chapter 5 provides the conclusion and recommendations.

1.1.1 Problem Statement

The key proposition for this research is based on the premise that by identifying incoherent areas with respect to agriculture policies and plans within the context of environmental objectives set in National Environment Policy of 2005 will be a useful input for removing distortion. Moreover, suggested improvements in the existing policies may provide a knowledge base for policy development at provincial levels. Most importantly, the study will explore the potential of SEA as a tool for change in public policy.

1.1.2 Aim and Objectives

The preset study aimed at reviewing existing agricultural policies in Pakistan for identifying gaps and deficiencies in the context of environment and sustainability commensurate with National Environmental Policy, 2005 of Government of Pakistan. The specific objectives of the study were as follows:

1. reviewing the selected agricultural policies for identifying gaps and deficiencies in relation to environment and sustainable development;
2. identifying the measures that have environmental and socio-economic impact;
3. assessing the adherence to environmental and social provisions in implementing the selected agricultural policies;
4. identifying and comparing alternatives for reducing detrimental impacts and enhancing sustainability of the agriculture sector; and
5. suggesting measures to remove the gaps and distortions in the policies.

1.2 Background

1.2.1 Definition of SEA

For general understanding, Strategic Environmental Assessment (SEA) is a systematic and anticipatory process undertaken to assess the environmental impacts of proposed policies, plans and programs including other strategic actions to integrate its findings in decision making. According to United Nations Economic Commission for Europe (UNECE) protocol on SEA, 2010, definition "*The evaluation of the likely environmental, including health, effects, which comprises the determination of the scope of an environmental report and its preparation the carrying-out of public participation and consultations, and the taking into account of the environmental report and the results of the public participation and consultations in a plan or program.* While according to OECD (2006) definition "*Strategic Environmental Assessment- a range of analytical and participatory approaches that aim to integrate environmental considerations in to policies, plans and programs and evaluate the inter linkages with economic and social consideration*".

SEA is needed because firstly, it counteracts some of the limitations of project EIA and secondly it promotes sustainable development.

1.2.2 History of development of SEA

The requirement of environmental assessment in public decision-making was introduced in United States through National Environmental Policy Act of 1970, covering 'major federal actions' (USG, 1969). While in 1978 the President's Council on Environmental Quality defined the actions to include regulations, plans, policies, procedures, legislative proposals and programs (Wright, 2006; Wood, 2002,) but in practice, it mainly revolved around environmental impact assessment (EIA) of project level proposals.

Later, SEA was introduced in the second half of the 1980s (Wood and Djeddour, 1992). The decision-making tiers to which SEA is applied, widely referred to as policies, plans and programmes (PPPs). Initially, SEA was developed in terms of the application of project EIA principles to PPPs (Fischer & Seaton, 2002). However, subsequently different interpretations emerged particularly in connection with different geographical and time scales of SEA and EIA (Lee & Walsh, 1992);different levels of detail at strategic and project tiers (Partidario& Fischer, 2004) anddifferent ways in which strategic decision processes are organized, in comparison with project planning (Nitz& Brown, 2001; Kornov&Thissen, 2000).

Now, SEA is being applied in a wide range of different situations, including trade agreements, funding programmes, economic development plans, spatial land use and sectoralplans; for example, transport, energy, waste, water sector policies, plan and programs.

1.2.3 Applications of SEA

SEA is applied to ensure integration of environmental considerations in decision making to support environmentally sound decision making for sustainable development. According to UNECE (2012) the process helps authorities and decision makers to take in to account:

- Key environmental trends, prospects and constraints that may affect or may be affected by the plan or program;
- Environmental objectives and indicators relevant to plan or program.
- Likely significant environmental effects of proposed options and the implementation of the plan or program.
- Measures to avoid, reduce or mitigate adverse effects and to enhance positive effects.
- Views and information from relevant authorities, the public and — as and when relevant — potentially affected states.

In principle, actions, whose subsequent application is likely cause significant environmental impacts to the extent that these cannot be assessed and mitigated satisfactorily at any other stage in the planning process requires SEA. This qualification is important as it provides a mechanism for

i) listing of policies, programs and plans (PPPs) in relation to their impacts and alternatives that are likely to need environmental assessment at some stage of the planning process but before project level authorization; and

ii) mechanism for screening to determine, within each of these categories, the most appropriate stages at which SEA should be undertaken.

Some forms of SEA in the following sectors are justified on the basis of aforementioned criteria;

- primary sector; e.g., agriculture, forestry, extractive industry, water supply and treatment;
- secondary sector; e.g., energy production, chemical and metal production and processing, construction;

- tertiary sectors e.g., tourism and transport. (Lee & Walsh, 1992).

On the basis of application of strategic environmental assessment, countries are classified in three forms i) countries with SEA as legal requirement, ii) countries those have incorporated within their planning process a more limited form of environmental evaluation (EE); and iii) are the countries those envisages introducing SEA or EE into their planning process. Number of examples in first category is very limited, number of countries in second category is greater and most of the countries lie in abovementioned third category which means that current application of SEA is still not widespread (Lee & Walsh, 1992).In this regard, two important international instrument which prescribe SEA for PPPs are European Directive (2001/42/EC) on the "Assessment of the Effects of Certain Plans and Programmes on the Environment" known as SEA Directive in 2004 and second is SEA Protocol to the Espoo Convention (UNECE) Convention on EIA in Transboundary Context) agreed in Kiev, 2003. Thus, SEA is a legal requirement in all twenty five member countries of European Union, USA, Canada, South Africa, and China etc.

SEA is applied keeping in view the data availability, level of definition of PPPs, knowledge regarding direct and indirect impacts and available timeframe for the SEA. Therefore, SEA is being applied in many forms including;

- "Stand Alone Process" parallel to core planning processes or integrated into the planning processes.
- May focus only on environmental effects or may take all three (environmental, social and economic) dimensions of sustainability.
- May be applied to an existing or PPPs that need revision, or may provide input to a developing PPP.
- May engage a broad range of stakeholders or may restrict only to expert policy analysts.
- Can be a finite output (report) based activity or a continuous process integrated within decision making (OECD, 2006).

SEA being associated with decisions on aims and objectives for future development, may deal with issues like need and demand management, and evaluating, e.g., different fiscal, regulatory or organizational and spatial development options.Many SEAs (including those not driven by legislation) use a continuum ofapproaches rather than a single approach. OECD

(2006: 17) describes SEA as a "family of approaches using a variety of tools rather than a single, fixed and prescriptive approach."(WorldBank, 2008).

1.2.4 Application of SEA to Policies

Application of SEA to policies has remained rare for example the EU SEA Directive while require SEA for plans and programs does not mention SEA for policies. However, many countries, including Canada, Denmark, Netherlands and New Zealand have implemented procedures to incorporate environmental considerations into policies. Some developing countries like Dominican Republic and Kenya had developed legislations regarding SEA of policies but application is rare. Such legislations typically extend impact based SEA methodologies to policy (Ahmed &Fiadjoe, 2006).

SEA is often described as a systematic process,built on linear assumptions about the development of public policy in progressive stages, and the rational capacities of individuals and organizations making the decisions. SEA involves following steps:

- Identifying key environmental impacts through a screening and scoping exercise;
- Assessing all concerns in a report that assembles information, considers alternatives, analyzes the potential impacts associated with all alternatives, and identifies measures to mitigate them;
- Making decisions and implementing recommendations following discussions with stakeholders;
- Monitoring and discussing results with stakeholders (World Bank, 2008).

Growing number of countries, developed as well as developing, have developed legislations or regulations prescribing the application of SEA and many more are now introducing it as part of their policy tools. The present situation create unique opportunities for improving policy making and planning process by incorporating environmental considerations into high-levels of decision-making and by opening mechanisms for intergovernmental and societal dialogue to reach consensus on development priorities (OECD, 2012).

1.2.5 SEA in Agriculture Sector

Agriculture and environment relationship is affected by the relationship between numerous biophysical and socioeconomic forces as shown in figure 1.1. Excessive and disproportionate use of agrochemicals has resulted in increased production costs and reliance on external

inputs and energy, reduced soil productivity, surface and ground water contamination, and adverse impacts on human and animal health. Therefore, in response to adverse environmental and economic impacts of conventional agriculture, emphasis on sustainable agriculture has grown (Rasul&Thapa, 2003).

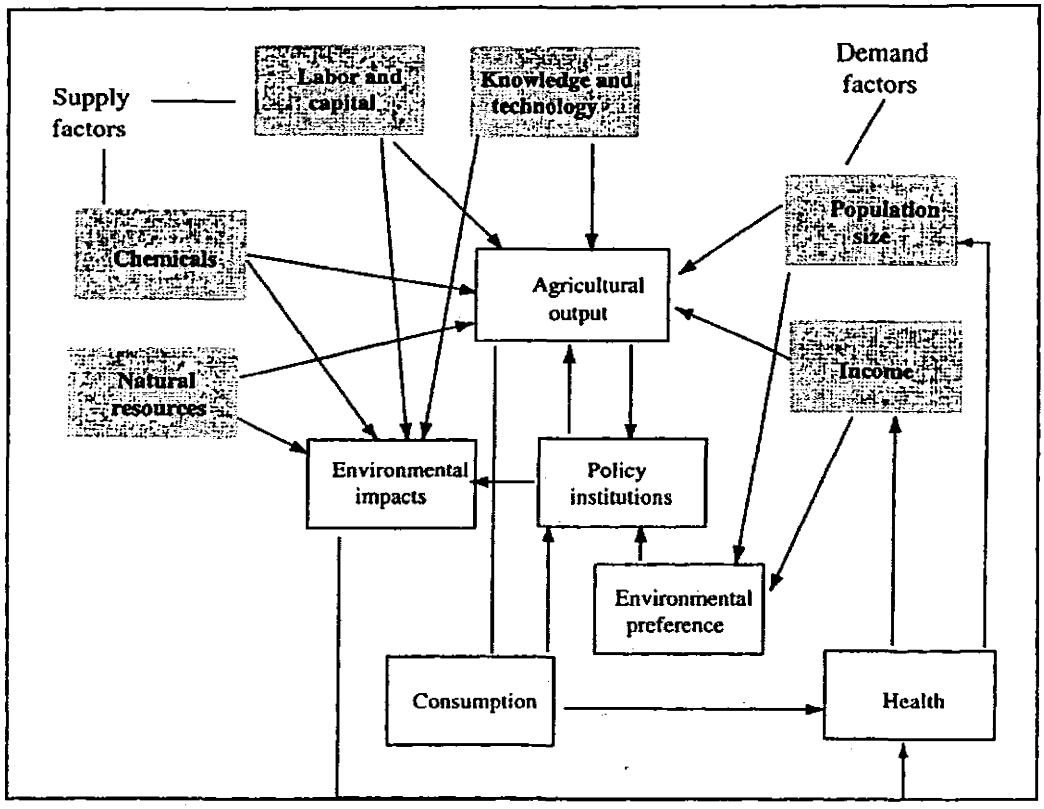

Figure 1.1: Factors affecting agriculture and environment
(Source: Zilberman*et al.*, 1999)

Sustainable agriculture is considered as low-input and regenerative system. It makes better use of farm's internal resources, and incorporatesnatural processes into agricultural production and uses improved knowledge and practices. External and non-renewable inputs are used to the extent that these are deficient in the natural environment. Three basic features of sustainable agriculture are (i) maintenance of environmental quality, (ii) stable plant and animal productivity, and (iii) social acceptability.

Thus agriculture is among one of the sectors where there is a dire need of integrating environmental and sustainability consideration in strategic planning. This sector is known to have significant environmental problems and can be highly influenced by policy (Tzilivakis*etal.*, 1999). However; agriculture has not remained the focus of SEA application worldwide unlike transportation, energy and industrial development where a lot of work has

already been carried out. Given below are the few important SEA studies in agriculture sector are;

1. SEA for UK Agricultural Policy (Rega*et al.*, 2011; Tzilivakis*et al.*,1999).
2. SEA for Swedish Agriculture (Engstrom*et al.*, 2007)
3. SEA for Next Step Forward Strategy for Scottish Agriculture (Scottish Executive Environment, 2006)
4. Strategic Environmental Assessment for biofuel development (OECD, 2011).
5. Strategic Environmental Assessment of Agriculture Sector in Rawanda

Some other studies focus on developing methods and indicators for implementing SEA in agriculture sector. In this context OECD (1997) has developed indicators for the measurement of thirteen priority areas that covers: nutrient use, pesticide use, water use, land use and conservation, soil quality, water quality, greenhouse gases (GHGs), biodiversity, wildlife habitats, landscape, farm management practices, farm financial resources and socio-cultural aspects related to agriculture and the environment.

1.3 Pakistan's Perspective

Pakistan's total area is 97.61 million ha, out of which 27% is under cultivation while 60% of the land area is classified as rangeland (World Bank, 2005). A significant contribution in Pakistan's GDP comes from agriculture sector i.e. 25% of the GDP (IUCN, 2009). Agricultural expansion has been powered by the country's gigantic irrigation network. Agriculture sector has gone through two major eras of productivity growth. The first phase was charaterized by the green revolution, when growth was driven by the introduction of high yielding varieties and new technology. Second era was of intensification where agricultural productivity increase was driven by high fertilizer, pesticide and water use (World Bank, 2005).

Despite the dramatic increase in productivity, the annual growth rate in this sector is highly variable averaging about 4-4.5% with highest growth rate of 11.7% in 1995-95 due to high yield of cotton, gram, milk and meat. Major crops are wheat, cotton, rice, sugarcane and maize account for 41% of the value added while minor crops add 10% in overall agriculture. Productivity levels are generally low in Pakistan due to non-availability of good quality seeds, inefficient irrigation practices, lack of education related to inputs and variable climate. Agriculture policies aiming at "green revolution" such as subsidies on pesticides & fertilizers,

relief in electricity tariff and plain tariff rates for tube wells has resulted in problems like lowering of water table, water logging, salinity and pollution of water courses.

Pakistan has two crop seasons, *"Kharif"* is the first sowing season starting from April-June and it is harvested during October-December. Rice, sugarcane, cotton, maize, lentils, sorghum and oat are "*Kharif*" crops. *"Rabi"*, the second sowing season, begins October-December and is harvested in April to May. Wheatlentil, gram, tobacco, rapeseed, barley and mustard are "*Rabi*" crops. These crops make Pakistan an agricultural country and its performance is dependent upon timely availability of irrigation water.

Pakistan has achieved an economic growth rate of 6.5% in 2002-2005, among highest growth rates in South Asian countries mainly due to ambitious reforms in its economic sector, however, social and environmental indicators continues to show the daunting development challenges faced by Pakistan. Estimated mean annual cost of environmental degradation is 6% of the country's GDP i.e. Rs. 365 billion per year (World Bank, 2006). Poverty has increased in the pursuit of strategies that mainly focus economic growth assuming its eventual trickle down affects that had never happened. Based on international experiences in this regard, global conferences strongly recommend incorporating environmental and social dimensions in economic growth in order to make the development sustainable. Environmental problems are often not only caused but also get accelerated by policies. Especially those policies which provide inappropriate incentives for practices that are detrimental to the country's natural resource base. In Pakistan, for example, some agricultural input subsidies have caused damage to the environment.

Provision of irrigation water at prices substantially below the cost of delivery, a policy that has increased water loggingis one of such examples, led to the loss of mangrove forest in the coastal area, and diminished biodiversity (IUCN, 1992). The former policy of subsidizing agrochemicals has led to excessive use of pesticides and fertilizers. Similarly, the policy of providing energy at below-market prices provides incentives to individuals to overuse the natural resource base.

Government of Pakistan (GoP) has taken remarkable initiatives in this regard from establishment of Environment Cell in 1972 (status was raised to Ministry of Environment in 1991) to preparation of National Conservation Strategy (NCS) 1992, National Environmental Quality Standards (NEQS) 1993, Pakistan Environmental Protection Act (PEPA) 1997, Pak-

EPA (Review of IEE/EIA) Regulation 2000, National Environmental Policy 2005, National Sustainable Development Strategy (NSDS), 2009 etc. Despite these initiatives, success remained limited. NSDS (2009) highlights two reasons for this limited success *i.e.* 1) environment is considered as sector rather cross cutting issue; and 2) public participation as well as support from other stakeholders including civil society, industry, and donors is required to cater the constraint of limited resources. However, the prevailing decision-making system tends to separate economic and social aspects, forgetting the environmental needs at the policy, planning and subsequently on implementation levels.

Among key failures in solving these problems, is the difficulty to integrate environmental sustainability criteria in the policy and planning processes (World Bank, 2006). Such issues have been highlighted in recommendation for PRSP-II;

> *"Environment cannot be managed in isolation or a standalone sector. It requires cross sector integration.* ***Proactive and environmental sensitive planning*** *can avoid adverse impacts, which are difficult and costly to remedy later on. Thus, the social, NRM, development and economic sectors need* ***mainstreaming ofenvironment*** *in policies, plans, programmes and projects by promoting the use of Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) tools. Ministry of Environment and the provincial environment departments need to* ***coordinate with and support*** *the sector ministries and provincial departments respectively in mainstreaming environment in their sectors" (Rao A.L., PRSP-II, Key Recommendations, undated).*

However, limited attention has been paid to these issues so far. Sustainable Development Policy Institute (SDPI), although have a mandate of policy reforms in Pakistan, currently focus on policy development rather addressing the critical issue of coherence among policies. A recent work "A Critical Analysis of Forest Policy of Pakistan: Implications for Sustainable Livelihood, highlights top down approach of all forest policies since 1962 to recent draft forest policy, 2000 is a good effort in this regard. The study shows that policy is in contradiction to principle of participation and sustainable livelihood of the communities (Shahbaz, *et al.*, 2006). Another sector which got attention in 1997 by IUCN is Thermal Power Generation Policy of Pakistan. Due to its widespread impacts on air pollution, location of Independent Power Plants (IPPs) and their connectivity with the main grid system was heavily criticized by WAPDA and energy experts (OECD, 2005). A recent study in this

regard is "Gap Analysis of Agriculture and Water Policies with respect to Climate Change" by International Union of Conservation (IUCN) in 2009.

SEA is currently not a legal requirement, and to date no formal SEA has been undertaken to assess the environmental repercussions of policies, programmes or development plans (Khan &Zakir, 2012).

Chapter 2

LITERATURE REVIEW

2 LiteratureReview

Strategic Environmental Assessment (SEA) is an emerging area of environmental assessment for policies, programmes and plans in the second half of 1980s. Although, a lot of work has been carried out by experts as well as organizations on developing its process, methodology, tools and application in various sectors however, variability in policies making processes, socio-economic conditions, administrative and governance mechanism has remained the limiting factors in universal applicability of these methods, tools and processes. Moreover, examples related to application of SEA are more concentrated to programmes and plans levels with a limited number of SEAapplied to policies particularly in agriculture sector. In this regard, literature reviewed for the purpose of this study was not only comprised of the application of SEA in agriculture sector but also focus on various tools, indicators, processes and SEA case studies in various sectors and particularly in agriculture sector.

2.1 Strategic Environmental Assessment

According to World Bank (2008) perspective, SEA extends the application of environmental impact assessment (EIA) to plans and programmes. International, regional and national SEA legislation usually fall under EIA legislations, extending its use to programmes, plans and in some cases policies. National legislation in Chinarequires SEAs of plans; the regional European SEA Directive (Directive 2001/42/EC) requires SEA for all programs and plans.

2.1.1 SEA in Practice

The development policy and planning processes affects the long-term success of development and play a significant part in progress of a country. Poor people in developing countries are often the first to suffer from the results ofpoor policy, planning or investment decisions which undermine development and lead to resource degradation. The seventh Millennium Development Goal (MDG), in particular, ensures environmental sustainability by making the principles of sustainable development an integral part of our policies and programmes.

Numerous tools and approaches are being used to integrate environmental concerns into strategic decision-making.One of the most promising approaches in this regard is strategic environmental assessment (SEA). SEA roots in environmental impact assessment (EIA) of development projects. In late 1980s, practitionersof environmental assessment turned their attention to assess environmental impacts of policies, plans, and programmes (PPPs). Many countries are now experimenting with SEA application to especially plans and programmes. While in some jurisdictions has also produced guiding SEA policies, laws or regulations. In Europe, this development has been given significant impetus with the coming into law of the European Directive on SEA. International development agencies has also test SEA in the 1990s, with the World Bank leading the way with a range of sector and regional environmental assessment initiatives.

The OECD DAC ENVIRONET SEA Task Team regularly surveysSEA activities in developing countries, and currently has tracked 150 separate initiatives. The survey results shows that many developing countries have started to legislate for the inclusion of SEAs within their policy making and planning processes. Regional development banks and donors have increased the application of SEAs at the planning level for sector programmes and plans (OECD, 2012). Table 2.1 provides useful information on progress (2009-2011) of SEA implementation in developing countries.

Table 2.1: Implementation Progress of SEA in Developing Countries

Region	Country	SEA Implementation
Asia	People's Republic of China	Recently passed a law requiring SEA for development plans and programmes Conducting extensive SEA trainings
	Indonesia	Increasing its capacity for implementing SEA
	Vietnam	Applying SEA in sectoral reforms programmes
	Cambodia	Using SEA for decentralization programmes
Africa	Ghana	Organized a two-day training course on "SEA in context of developing countries" at IAIA
	Tanzania	Exploring the possibility to increase the use of SEAs in the natural resource
	Namibia	Uses SEA to manage the current uranium rush

	Zambia	Carried out SEAs on tourism in the Victoria Falls area and the Kasaba Bay area Minning, sugar and chemical industries Working on SEA legislations
	Guinea Bissau	Passed federal law for SEA, received training support from WWF
	Morocco and Tunisia	SEA for large scale investment programmes
	Mali	SEA for small scale irrigation programmes
	Kenya	SEA scoping studies for the Lamu/Tana regional development and Mara river policy option
	Mauritania	SEA training for civil society
	Senegal	MoU has been signed with the Netherland Commission Environmental Assessment for capacity building on SEA
	Sierra Leone	UNEP and WWF organized a week long training of 100 participants, Legislating SEA, conducting district level SEA, conducting an institutional level SEA, providing training to parliamentarians
	Mozambique	SEA for private sector development in natural resources
Latin America	Peru	Conducted SEA for energy policy, introducing SEA legislation
Caribbean	Trinidad and Tobago	SEA for Waste Water Management Strategy Considering establishment of SEA units in Oil and Gas Sector
Middle East	Iran	Established Environmental Assessment Centre Law related to Environmental impacts of strategic decision making for fifth five year plan (2011-2016).

(OECD, 2012)

2.2 Environmental Issues in Agriculture Sector

The long-term challenge faced by agriculture is to produce sufficient food and other industrial crops efficiently, profitably and safely, to meet growing demandofworldpopulation without degrading natural resources and the environment. While agriculture activity has improved substantially, it often resulted in resource degradation, such as soil erosion and water depletion (OECD, 1998), and damage, e.g. to genetic diversity, which may result in impaired growth in farm output. On the other hand,farmers have also made positive

contributions to landscapes and the maintenance of rural communities. Agricultural lands also served important habitats forwildlife and act as sink for greenhouse gases (OECD, 1999).

Differences in climate, agro-ecological zones, population density, levels of economicdevelopment, and the relative importance of environmental problems vary widely from one country to another and also within countries. These differences are reflected in perceptions across andwithin countries as to what is meant by the "environment" in agriculture. For some, the "environment" covers only biophysical and ecological aspects. For others, landscape, culturalfeatures, and rural development are also important. In recent years, the quality and safety of food, andthe welfare of farm animals, have become more prominent policy issues, perceived as being closely related with the environment (OECD, 1999).

Adverse health effects of pesticides, contamination of groundwater due to agrochemicals, soil erosion and siltation, diversion of water from ecosystem flow to crops irrigation, and loss of forests, ranges, or wetlands to crop land contribute to the perception that agricultural production intrinsically conflicts with environmental quality (Zilbermanet *al.*, 1999).

Indo-Gangetic Plain of northern India and Pakistan are among one of the largest concentrations of poor people in the world. The agricultural sector, which employs more than half the area's 500 million inhabitants, has long been the key to food security and poverty alleviation for population residing here. In1960s, Green Revolution technologies were brought in the area which includes high-yielding modern varieties of two major crops (rice and wheat). This change was further supported by investment particularly in irrigation network and market infrastructure development. Consequently, the area experienced a dramatic increase in agricultural production, especially in Indian and Pakistani Punjab Province. However, intensification of input use in adoption to Green Revolution technologies will provide lower marginal returns now (Byerlee, 1992). The continued intensification of cropping will also cause the degradation of the resource base in the form of salinization, overconsumption of groundwater, physicochemical deterioration of the soil quality, and pest and disease attacks (Fujisakaet *al.*, 1994; Siddiq 1994).Now great concern is about the productivity growth potential in irrigated Green Revolution systems and their sustainability over the longer term.

Similar finding have been reported by Rasul and Thapa (2003) for agriculture in Bangladesh. The study mentions that sustainability of conventional agriculture is under continuous threat

from the degradation of land and water resources, and from declining yields due to indiscriminate use of inputs. The study also highlights that scarcity of land is a major factor for intensification of land, fertilizers, pesticides and water to increase the food production. Subsidies are provided for chemical fertilizers, pesticides and irrigation equipment to enable farmers to adopt these technologies for increasing crop yields. Consumption of agrochemicals increased six-fold between 1970 to 1990, out of which use of pesticides increased about three-fold in just one decade, i.e. 1982 to 1992. Major changes in cropping patterns, uses of agricultural inputs, and management of soil fertility will be required to overcome these issues.

More than 65% of the total agricultural area suffers from declining soil fertility out of whichabout 85% of the net cultivable area has less organic matter than the minimum requirement for maintaining soil productivity. The increased consumption of chemical fertilizers, insecticides and pesticides has led to the contamination of water bodies and spread of diseases, adversely affecting aquatic life, livestock and people's health (Rasul&Thapa, 2003).

According to Morrison and Pearce (2000), agricultural policies effect agricultural activity in a way which may be harmful to environment and natural resources. The study shows that in case of South Africa, policies had affected the agricultural activity in three ways;

i) incentives provided to cereal production compared to livestock production leading in extensive area under cereal cultivation;
ii) the probability that fertilizer use was greater than optimal; and
iii) the high levels of protection afforded the sugar cane sector and expansion in its cultivation on inappropriate terrain.

The study suggests a successful environmental policy employing a combination of three principle components; knowledge of environmental status and the ability to monitor at the local level, the legislative framework and code of practice governing farmers' activities and the will and ability to implement these policies.

In many cases,environmental problems aggravates by agricultural and trade policies thatdistort price signals by linking support to agricultural commodities, or by disguising the costs ofagricultural inputs. The economic distortions created by such policies can lead to environmentallyinappropriate patterns and location of production, environmentally harmful

use of inputs, anddiscourage the development and adoption of farming technologies less stressful on the environment (OECD, 1999).

2.3 Agriculture Sustainability Indicators

From a policy perspective a distinction needs to be made between those agricultural activities thatbenefit, and those that harm the environment, and those activities that are accounted, or not accountedfor by farmers in their decisions. Whichever "baseline" is chosen, the direction ofchange of an environmental effect will indicate whether there has been an improvement ordeterioration in environmental performance. This requires quantitative information, includingindicators.According to OECD (2003),indicator can be defined as "a parameter, or a value derived from parameters, which points to, provides information about, describes the state of a phenomenon/environment/area, with a significance extending beyond that directly associated with a parameter value". With reference to this terminology, indicators perform two major functions;

1. Indicator reduce the number of measurements and parameters required to present an exact presentation of the situation;
2. Indicators simplify communication process by which the results of measurement are provided to the users.

OECD (1999) highlights following (Table 2.2) key agri-environmental issues for relevance to policy makers;

Table 2.2: Key agri-environmental issues of relevance to policy makers

SOIL	Soil salinity, acidity, trace elements balance, toxic contamination, compaction, waterlogging &soil organic matter, soil productivity, soil erosion and landslides.
WATER	Surface, ground, & marine water quality affected by the run-off or leaching of nitrogen, phosphorous, toxic pesticide residues, acids and soil sediments. surface and groundwater resource use, spatial & temporal distribution of water resources, loading and discharge of surface water.
AIR Contamination	Air contamination from pesticides, soil, livestock odours, and biomass burning.
Climate change	Emissions of greenhouse gases from agriculture, agriculture as a sink for greenhouse gases, energy use.
Ozone depletion	Stratospheric ozone depletion from the use of some ozone depleting

	chemicals in agriculture, such as methyl bromide.
NATURE Biodiversity Habitats Landscape	Biodiversity of "domesticated" plants and livestock; and "wildlife" biodiversity Wildlife habitats on agricultural land, semi-natural and natural habitats. Landscape features arising from the interaction of topographical features, climate, distribution of biotopes, farming systems, and socio-cultural values.
FARM FINANCIAL	Financial resources available to farmers, which can influence farmer behavior inrelation to the environment.
SOCIO-CULTURAL	Balance between rural and urban population

(Source: OECD, 1999)

2.4 Pakistan Perspective

Agriculture, industry and service are the three major pillars of Pakistan economy (GoP, 2013). Like most developing countries, Pakistan faces serious environmental problems. Rapidpopulation growth and impressive GDPgrowth have put enormous pressure on the country's natural resourcebase and have significantly increased levels of pollution. For example, from the mid-1960s to mid-1990s, availability of water for agriculture more than doubled and the cultivatedland area expanded by almost 50 percent. Rapid growth in industrial production and urbanization haveled to increased waste water pollution, solid waste, and vehicular emissions that haveresulted in serious health problems in many areas of the country. According to Farquee (1996), environmental problems are often results of inappropriate economic policies. Table 2.3 describes some of the economic and environmental effects of both past and present economic policies in Pakistan.

Table 2.3: Pakistan Economy wide policies and its impact on environment

Policy area	Policy instruments	Outcome	
		Economic	Environmental a/
Agricultural policies	Support prices Input subsidies Public expenditures on agricultural infrastructure	Increased cultivable area Increased crop yields Increased irrigation water use Increased fertilizer and chemical use	Change in soil quality Change in agricultural run-off Change in rate of deforestation
Industrial policies	Controls on industrial imports and exports of raw materials	Increased industrial output Increased energy use	Increased industrial emission Increased industrial waste water pollution
Trade and exchange rate policies	Removal of quantitative restrictions Lowering of tariffs Exchange rate devaluation	Higher returns to efficient sectors (cotton, for example) Changes in agricultural output pattern Change in energy cost	Change in use patterns of agricultural inputs Change in land use patterns Change in rate of deforestation
Fiscal balance	Broadened tax base Reduction in agricultural input subsidies Reduction in energy subsidies Reduction in rural development elimination of some poverty safety nets	Increased rate of economic activity Decreased agricultural input use Increased energy conservation Decreased research and extension Increased poverty levels	More efficient resource use Lower air and water pollution levels Decreased soil degradation and agricultural run-off
Private sector development	Sale of public enterprises Promotion of private sector promotion	Increased industrial production and efficiency	Change in industrial pollution
Redistribution of income and wealth	Land reform Labor protection laws Social and safety net programs	Changes in income and consumption patterns	Change in pattern of land use

(Source: Farquee, 1999)

Pakistan has been blessed with a rich and immense natural resource base, covering a variety of ecological and climatic zones, with a great potential for producing a range of agricultural crops. Prior to green revolution in the 1960s cropping patterns and systems were quite diverse. But with green revolution technologies and focus on attainment of food self-sufficiency, a narrow band of cropping systems developed like rice-wheat and cotton –wheat systems and became predominant (GoP, 2009). Thus, in the last three decades of the 20th century, Pakistan experienced an unprecedented technological and economic transformation. It was able to achieve food self-sufficiency, its agricultural exports tripled, increase income levels, and improve quality of life for it citizens. Transformation was supported by policy

environment, incentives in the form of input subsidies, and investment in agriculture infrastructure, including irrigation, research and extension services. As a result, by the end of 20th century almost all of the irrigated wheat and rice area was cultivated under high yielding varieties irrespective of farm size. Similarly, cotton production tripled and sugar production doubled in this time period. Cereal production was more than doubled on the same area under wheat and rice in 1970.Despite this dramatic increases in productivity, Pakistan's performance has not been exceptional. Pakistan has low wheat yield, for example Egypt with broadly same agro-climatic conditions have wheat yield that is three times higher than Pakistan (World Bank, 2005).

Prior to 1960s, agricultural growth was based mainly on an increase in cultivated area. However with the increase in population, the availability of land per person started declining. Production and productivity growth rates of major and minor crops tapered off by 2000. Yield gaps when compared with optimal yield potentials have widened, lying between 40% to 50% for major crops. Major constraints faced in this regard are macro-economic stability, geographically dispersed and small-scale farms, low-capital intermediaries, unsustainable management of land and water resources and poor environmental management (GoP, 2009).

METHODOLOGY

3 Methodology

3.1 SEA Approach

Many countries and agencies have developed their guidelines for conducting SEA like Good Practice Guidelines developed by OECD (2006), which divided Strategic Environmental Assessment (SEA) process in to four main stages and each stage has further been divided into various steps as presented in figure 3.1 below.

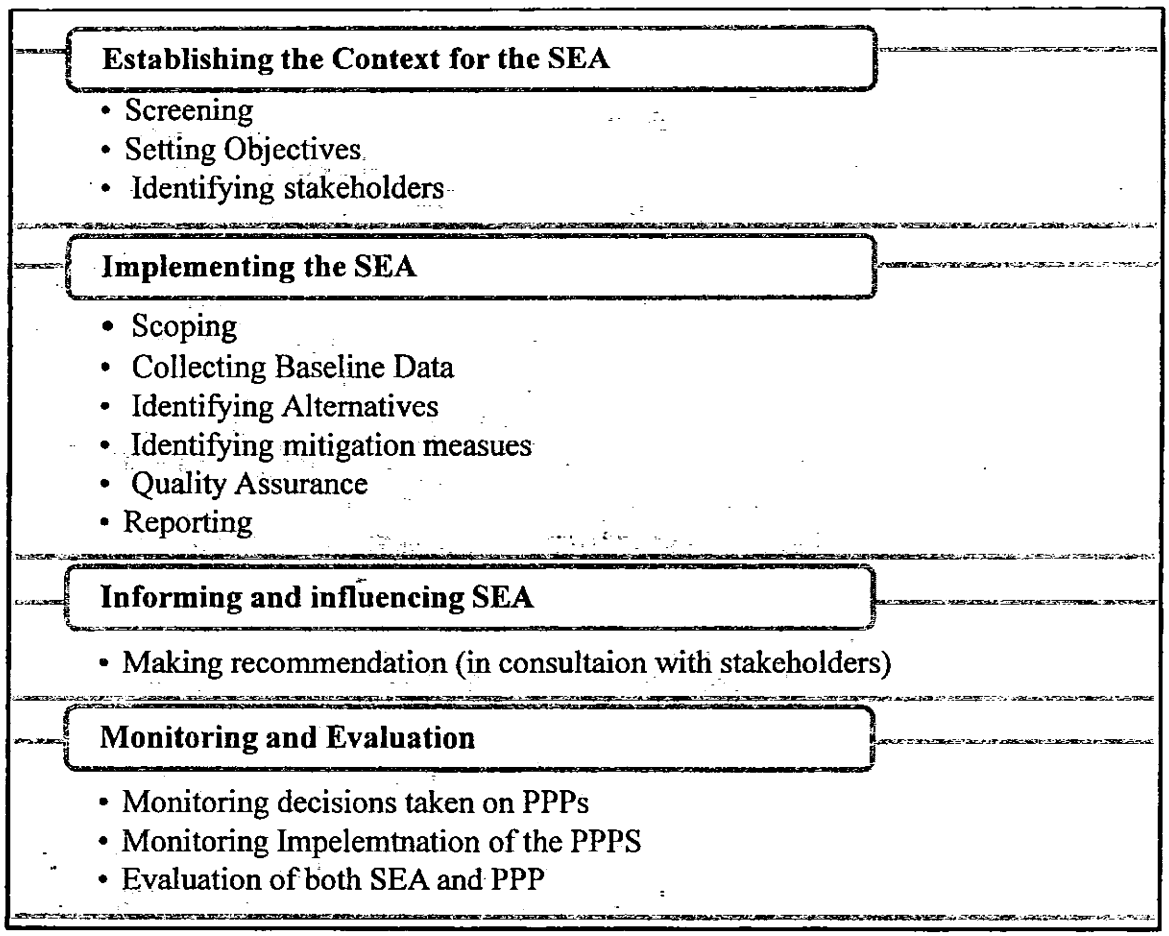

Figure 3.1: Four Stages of SEA Process

(Source: OECD, 2006)

However, keeping in view the time constraint and flexibility of SEA process, it has not been planned to carry out all steps in this study. For the purpose of present study only first two stages were focused. The latter two stages are although important to implement SEA in

various sectors however, could not be covered under the scope of this study. The step related to quality assurance could not be followed due to limitations of availability of national statistics on parameters required for this study.

3.2 Study Framework

Present study mainly involved critical analysis of agricultural policies and plans. Study was done by adopting a holistic approach which included:

3.2.1 Review of the related documents for setting SEA Objectives

The Agriculture Policy of 1991 was in use for guidance to agriculture sector and the process to develop a new agriculture policy was started in 2009 but could not be completed. At present, the Government of Pakistan does not have an approved national policy that covers the agriculture sector in holistic way. Although, a draft document is available "Agricultural Policy of Pakistan, 2009-2010", which could not be finalized due to 18th amendment in the constitution of 1973 on 18th April, 2010, which resulted in the change of status of agriculture from federal to provincial subject, hence the Ministry of Food and Agriculture was devolved to provinces. Prior to that the Agriculture Policy of 1991 was the only document used for policy guideline till the devolution of the agriculture to provinces.

However, some associated documents are available that serve as policy guidelines for planning in agriculture sectori.e. Pakistan Vision, 2030 and Five Year Plans. Some other policies like wheat policy, cotton policy, and corporate farming policy are also available but do not focus on agriculture as a whole. For example, wheat and cotton policies are released on every fiscal year that mainly describes the production targets and government rates for these commodities. The Vision 2030, Medium Term Development Framework (MTDF) and other documents like Agriculture Perspective & Policy (2004) were serving the purpose of policy within their scope.

In fact, policy document only shows broad commitment, which is fulfilled through planning and implementation process. Therefore, for this study, the critical review of policy commitments was carried out to analyze the cohesion of the whole framework of policy, planning and implementation contained in the following government's documents.

1. Agriculture Perspective and Policy, (2004)
2. Planning Commission's Medium Term Development Framework, (2005-2010)
3. National Medium Term Priority Framework (2007-2010), MINFA

1. Vision 2030: Agricultural Growth: Food, Water and Land (2007)
4. National Environmental Policy of Pakistan, (2005)
5. Sustainable Development Strategy of Pakistan, (2009)
6. National Climate Change Policy of Pakistan (2012)

3.2.2 Screening

In this study the draft Agricultural Policy of Pakistan of 2009-2010 was screened using Danish Environmental Checklist (Partidario, 2004)consisting of 57 significance criteria grouped into 11 categories ranging from physical, ecological, social and risk issues.

3.2.3 Consultation with Experts

Individual and collective focused group meetings were conducted with the experts on environment and sustainable development and relevant officials to know their views and concerns regarding agriculture sector policies. The following national and international experts and government officials were consulted in this study.

1) **Mr. Ahmed Saeed**
   Project Manager, NIAP, IUCN
2) **Dr. Bobi Schiff**
   SEA Expert, Netherlands EIA Commission
3) **Dr. Bob Verheem**
   SEA Expert, Netherlands EIA Commission
4) **Mr. M.B. Siddiqui**
   Deputy Secretary, Agricultural Policy Research Institute, Islamabad.
5) **Mr. Ali Murad**
   Researcher, Agricultural Policy Research Institute, Islamabad.
6) **Mr. Fareed**
   Section Officer, National Fertilizer Development Commission, Islamabad.

3.2.4 Development of Matrix

To identify the gaps and issues of concerns in agriculture policies, objectives of agricultural policies and plans were analyzed in the context of objectives set under sector specific policy measures in National Environmental Policy of Pakistan (GoP, 2005). Comparison of two

objectives led to identification of areas which are not covered in agriculture policies and result in policy distortion.

3.2.5 Identification of Environmental Problems

Environmental problems were identified through secondary data. Although reported literature quotes a long list of environmental problems caused as a result of inappropriate agriculture policies that include land degradation, irrigation inefficiency, water quantity and quality problems, low crop yields, low nutrient balance however, time series data for all of these parameters is not available.

For the purpose of the present study, following indicators were used to identify environmental problems;

A. Agriculture Performance Indicators
   i. Agriculture Growth Rate,
   ii. Productivity of Major Crops
   iii. Livestock population
   iv. Use of Fertilizer (off take) (1990-2009),
   v. Fertilizer Growth Rate (1995 – 2008)
   vi. Total Food Crop Yields (1981 – 2009)
   vii. Total area under food crops (1981 – 2009)
   viii. Agriculture Credit Disbursement (current status)
   ix. Availability of Improved Seed (current status)
   x. Availability of Water (current status)

B. Environmental Performance Indicators
   xi. Employment
   xii. Soil nutrient balance/soil salinity (time series data was not available)
   xiii. Fertilizer/pesticide pollution in water bodies (time series data was not available)
   xiv. Biodiversity
   xv. Land degradation/soil erosion
   xvi. Climate change/air emissions

3.2.6 Identification of Alternatives/Mitigation Measures

Based on the findings from section 3.1.3 and section 3.1.5, actions proposed under policies which resulted and are/orare causing environmental problems were identified and policy

measures, alternative actions to achieve the targets were suggested. In case alternatives were limited, mitigation measures to minimize the effects were suggested. A mitigation hierarchy was followed *i.e.* first avoid; second reduce and third offset the adverse impacts using appropriate measures as prescribed by (OECD, 2006).

RESULTS ANDDISCUSSIONS

4 Results and Discussions

Present study regarding SEA of agricultural policies in Pakistan has been structured around analysis of agriculture sector policies actions with special focus to "Draft National Agriculture Policy 2009-2010" against set of environmental and sustainability objectives. These objectives were identified on the basis of policies analyzed and tailored to assess the identified problems related to Pakistan's agriculture where appropriate. Like many other developing countries, agriculture is an essential component of Pakistan's economy, currently contributing 21% of gross domestic product (GDP). Agriculture sectors generates a productive employment of 45% of the country labour force and 60% of the rural population depends on agriculture for their livelihood. After 18th Amendment of the 1973 Constitution, agriculture sector has become provincial chapter, however realizing the importance of food security concerns across country, government has established the National Ministry of Food Security and Research (GoP, 2012) which share some of the tasks with agriculture sector in terms of food production, its access to market, and means to increase the food production.

4.1 Policy Framework for Agriculture Sector

Due to the wide-ranging nature of a national agriculturestrategy, many documents and policies were reviewedin reference to their impacts on the environment. The specific information relevant to national agriculture policy of Pakistanwas limited (IUCN, 2009). Agriculture development in Pakistan was mainly guided by Agriculture Policy 1991 by the start of 21st Century, but a worldwide shift has appeared in terms of green to gene revolution (GoP, 2007) which makes this document somewhat dated in this regard. There are several policies which cover different dimensions of the agriculture sector e.g. corporate farming policy, wheat policy, cotton policy etc. These policies although studied but do not make an integral part of the research.

As discussed in chapter 03 Methodology of this document, in absence of any official approved National Agriculture Policy, other strategic documents like Agriculture Perspective and Policy (MINFA, 2004), National Medium Term Development Framework (2005-2010), National Medium Term Priority Framework (2007), Vision 2030 were filling the gap created

by absence of national policy until a "Draft National Agriculture Policy (2009-2010)", was prepared with technical assistance of Asian Development Bank (ADB) in 2009. The policy could not be finalized due to 18th amendment in the constitution of 1973 on 18th April, 2010, which resulted in the change of status of agriculture from federal to provincial subject, hence the Ministry of Food and Agriculture was devolved to provinces. The draft document of the policy claims strong footing of its strategies on MTDF (2005-2010) and Vision 2030. Therefore, below is the brief description of strategic document reviewed to assess performance of agriculture sector in terms of environmental and socio-economic parameters.

4.1.1 Draft National Agriculture Policy (2009-2010)

The framework laid down in the Poverty Reduction Strategy paper I (PRSP I), the Medium Term Development Framework (MTDF) and the approach paper for the Tenth Five Year Plan are the basis of the national agriculture policy 2009-10 (NAP) that build upon elements drawn from agricultural to sustainable rural economic growth strategy. The vision of the policy is improving the quality of life of the citizens of Pakistan by removing hunger and malnutrition from the country by making agriculture as an efficient, productive and profitable sector of the economy in a manner that its growth is sustainable and outputs are competitive. Strategy adapted to achieve the agriculture development goals is based on;

(a) Strengthening and reinvigorating existing agri-based supply chains which demonstrate clear competitive advantages for Pakistan. These are;
    i. Wheat Policy Chain
    ii. Rice Policy Chain
    iii. Sugarcane supply Chain; and
    iv. Cotton Textile

(b) Facilitating the establishment of potential agri-based supply chains. These include;
    i. Horticulture Supply Chain
    ii. Edible Oil Supply Chain

The key areas of policy action as identified in the policy document are

- Get the price and incentives right in the product markets
- Get the prices and incentives right in the resources based and other factor markets
- Invest on productive and market infrastructure

- Invest on science and technology-based research and development and explore innovative ways of disseminating and promoting new technologies.
- Invest on efficient and effective institutions for integrated agri-based value chains.

Protection of environment and preparing for climate change has been mentioned under cross-cutting themes in IV part of the NAP document. Actions suggested are mainly relates to areas of efficient water use and conservation through building of reservoirs, maintenance of existing water resources, recycle and reuse of water and reduction in water losses to avoid water scarcity and improved irrigation with community involvement, consumer awareness on safety and protection, formulation of marine pollution act, action plan for alternative fuels and adjusting cropping pattern with climate change.

4.1.2 Agriculture Perspective and Policy (2004)

1097c

The document was developed by Dr. Muhammad Hanif, Dr. Shakeel Ahmed Khan and Fayyaz Ahmed Nauman and is not an official policy document. IUCN, (2009) also do not consider this document an official policy. However, document is important as it provide a holistic view of current state of agriculture sector, major challenges and future prospects. Document has been considered as strategy paper for development of policies like National Medium Term Priority Framework (2007-10). The policy focus was on sustainable food security, increasing productivity, commercial agriculture, imports substitution, income diversification and export orientation. The overall policy goal is to raise the productivity and profitability of farming community enabling the citizens to raise their living standards particularly in rural masses.

4.1.3 Medium Term Development Framework (2005-2010)

MTDF (2005-2010) identifies the role of agriculture sector in accelerating economic output growth and sets a target of annual growth rate of 5.2% during the MTDF period i.e 2005-2010. Major challenges faced by Pakistan's Agriculture to achieve the aforementioned target have been identified in MTDF (2005-2010) and summarized in Box 4.1.

Box 4.1 Major Challenges Faced by Pakistan Agriculture

- Availability of Water
- Low productivity of corps
- Inefficient use of water

- Degradation of land resources (waterlogging and salinity)
- Imbalance application of fertilizers
- Inefficient use of agricultural inputs
- Ineffective transfer of technology to the farmers
- Lack of coordination between research and extension
- Post-harvest losses
- Marketing infrastructure

(Source: GoP, 2005)

The measures suggested to achieve annual growth rate of 5.2% are to;

- Enhance productivity of crops through development of new technologies, high yielding disease resistant varieties, scientific methods of farming and improved management practices.
- Efficient use of water through precision land leveling and high efficiency irrigation systems.
- Promote production and export of high-value crops.
- Promote import substitution by enhancing the production of oilseeds and tea.
- Ensure availability of agricultural credit especially for small and medium farmers.
- Improve income of the farmers by providing incentives through the support price mechanism, reduce post-harvest losses and promote processing/value addition.
- Improve marketing infrastructure.
- Improve efficiency of agricultural inputs and ensure their timely availability to the farmers.
- Strengthen agricultural institutions for research and extension and improve their linkages and coordination (GoP, 2005).

4.1.4 National Medium Term Development Priority Framework (2007-2010)

The National Medium-Term Policy Framework (NMTPF)for Pakistan's agriculture sector is a Government of Pakistan (GOP)'s strategic planning & programming tool to facilitate external technical assistance resource mobilization. The Food and Agriculture Organization (FAO) of the

United Nations had been requested by the GOP/Ministry of Food, Agriculture and Livestock (MINFAL) to assist and facilitate in the preparation and development of the NMTPF. To ensure active participation, ownership, and sustained follow-up actions of the NMTPF by

GOP/MINFAL and other stakeholders of the agriculture sector in Pakistan, eight technical Core-

Groups of senior agricultural development practitioners were established.Eight ***Major Agricultural Thrust Areas (MATAs)***Core Groups were formed: (i) Crops & Horticulture (ii) Livestock & Fisheries; (iii) Forestry; (iv) Water; (v) Food Security; (vi) Agri Business; (vii) Trade; and (viii) Emergencies & Disaster Management.

Agricultural Development Strategy (ADS)'s ConceptualFramework is simple and uses common-sense logic & "non-technical" (agriculture) terminologies to facilitate the "marketing" to, and "buying-in" from, important policy/decision makers and development leaders & planners. As clear from the figure 4.1, there are three level of strategies;

(1) **The priority ultimate strategy (PUS),** consist of one component:

PUS-1 Repositioning agriculture competitiveness in national and global economy

(2) **The priority Core Strategy (PCS),** consist of three components;

PCS-1: Ensuring Food security, Environmental sustainable agriculture and consumer safety

PCS-2: Facilitating Rural Renaissance through entrepreneurship among SME and resource poor agricultural labor force

PCS-3: Optimizing disaster management and emergency preparedness

(3) The Priority Support Strategy (PSS) consist of three components;

PSS-1: Strategy Development &Prog./Project Formulation Technical Assistance

PSS-2: Providing quality client care/support through improved agri. service deliveries

PSS-3: knowledge management and tacit knowledge sharing for agriculture sector organizational learning

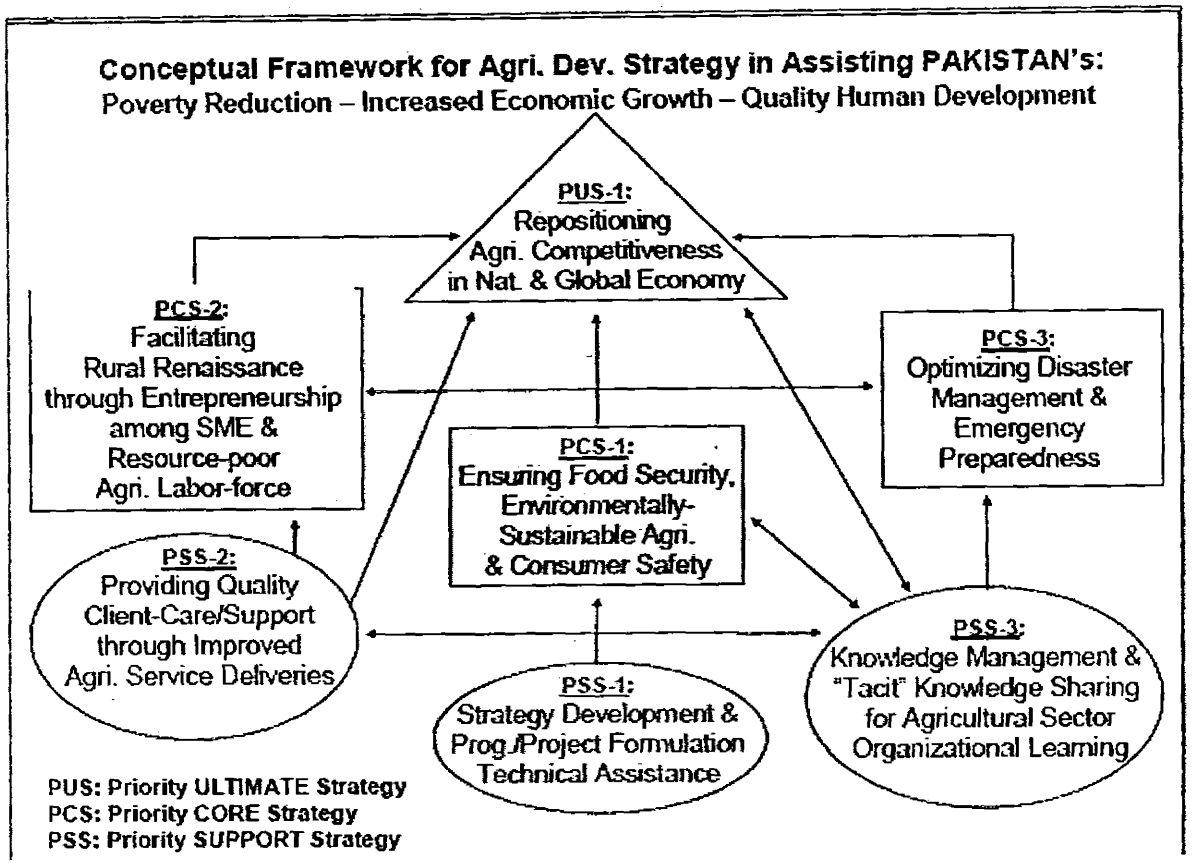

Figure 4.1 The Agriculture Development Strategy Framework
Source: (GoP, 2007)

4.1.5 Vision 2030: Agriculture Growth: Food, Water and Land

According to foreward of this document, Vision 2030 is a logical reflection of the turnaround which transformed a stagnating economy into a vibrant one. Chapter 6 of this document specifically address "Agriculture Growth; Food, Water and Land based on the vision of an efficient and competitive sustainable agriculture ensuring foodsecurity, and with ability to contribute to the economic development for Pakistan. Box 4.2 shows the major challenges of Pakistan's Agriculture Sector as presented in Vision 2030;

Box 4.2 Major Challenges Faced By Pakistan Agriculture

- Doubling of output of several crops, pulses, oilseeds horticulture, livestock and fisheries production exclusively through productivity increases;
- Improving the nutritional quality of staple foods to provide essential nutrientsfor such as iron, vitamins, amino acids and proteins;
- Diversification into high value agriculture and value added products.
- Reducing the loss of fertile land to urbanization
- Private sector-led growth through investments in value added products, both domestic and export markets, such as floriculture using hydroponics technology for

export oriented high-value vegetables/flowers.

- Improving marketing systems, especially for perishable commodities
- Sustainable management of the natural resource base and protection of the environment
- Public investments in rural infrastructure and institutions including water management, research and extension, education, health, water supply and sewerage
- Encouraging balanced use of renewable biomass suitable for production of biofuel(biomass from wastelands, castor, jatropha3);
- Mitigating the impact of climate change

Source: (GoP, 2007)

Following actions were suggested to meet the challenges

i) **Green to Gene Revolution**

a. Investment in public sector in the area of agri biotechnology
b. Application of agri-biotechnology beyond crop sector to increase the yield of food, feed and fiber biotechnology in livestock production to increase the milk and meat production, disease resistance, detection and prevention, drug and vaccination production etc.
c. Germplasm enhancement, Human resource development
d. Establishment of research centers on agro-economics

ii) **Integrated water resource management**

a. Incentives will be provided for the adoption of water saving technologies such as land leveling, furrow irrigation and high efficiency irrigation systems.
b. Encourage rain harvesting
c. Drought tolerant and wateruse- efficient crop varieties through biotechnology
d. Devise and implement National Biosaline Agriculture Program

iii) **Livestock and Dairy**

a. Improve the skill technology and training among people especially in women as women outnumber men by nearly 50% in these two activities
b. Development of rural infrastructure to provide opportunities to farmers for marketing their products.

iv) **Food Security for all**

a. Production targets have been set for food commodities i.e wheat, rice, sugarcane, Fruits, oil seeds, meat and milk as provided in table below.

v) **Facing Poverty**

a. Changing pattern of National Food Basket suggest a shift from cereals to increase requirement of pulses, oil, vegetables and meat.

b. Public sector should ensure that small farmers and resource poor areas are not left further behind by the upcoming gene revolution.

vi) **Globalization and Agriculture**

a. Meeting WTO agreements and standards for agriculture commodities to increase export opportunities

b. Investment in the transport and preservation technologies

vii) **Managing Natural Resources**

a. Sustainable management of natural base to meet the needs of present and future generations.

viii) **Climate Change**

a. Application of science and technology and sustainable management ofnatural resource base, which in turn requires major investment in humanresource, reforms in agricultural practices and rural institutions, infrastructure,and management of challenges from globalization, biotechnology and climatechange.

It is clear from the above description of the policy goals that ultimate goal of the agriculture development is to ensure food security of the citizens, economic development, increasing agriculture growth rate and maintaining the natural resource base. The summary of the highlights of review has been presented in Table 4.1 below which shows issues consideredunder SEA.

The summary of comparison is presented in Table 4.1, which clearly shows that policies are quite consistent regarding ultimate goal for agriculture sector. Statement of goal under all five policies covers the triple bottom line of sustainable development that is economic, social and environmental. However, according to Olsson *et al.,* (2009), policy could have separate ultimate goals for each of the three dimensions of sustainable development. As clear from the table 4.1, social dimension of the policy target at ensuring food security while economic dimension focus on increasing competitiveness in the market for which agricultural productivity of particularly value added crops need to be increased.

Table 4.1: Synergies between Agricultural Policy Documents

SEA Areas	Draft National Agriculture Policy (2009-10)	Agriculture Perspective & Policy (2004)	MTDF (2005-2010)	NMTPF (2007-2010)	Vision 2030
Ultimate Goal	Improving the quality of life of the citizens of Pakistan by removing hunger and malnutrition from the country by making agriculture as an efficient, productive and profitable sector of the economy in a manner that its growth is sustainable and outputs are competitive	To raise productivity and profitability of the farming community enabling the country to raise living standard of rural masses	Achieve self-reliance in agri. commodities, ensure food security & improve productivity of crops. Annual growth rate of 5.2%	Repositioning Agri. Competitiveness in the National & Global Economy"	Efficient and competitive sustainable agriculture ensuring food security and with ability to contribute to the economic development and poverty alleviation in Pakistan.

Social Dimension	**Ensure Food Security** **Equitable access of all producers to natural resource based factors** **Stronger linkages of producers with factors of productivity** **Reforming agricultural and non-farm rural institutions** **Gender mainstreaming**	**Sustainable Food Security** • Improving grain & sugarcane production • Cotton production to 15million bales by the year 2010 • Agriculture Credit • Promotion of horticulture • Import Substitution of oilseeds, tea, pulses • Crop-diversification • Promotion of high value crops • Land use planning	**Improving income of farmers** • Support price mechanism • Reduce post-harvest losses	**Ensuring Food Security** • High tech & sustainable agriculture • Health &env. safety • Improving water utilization, conservation & management technologies • Water resource development • Competitive horticulture & crop sub-sectors • Economic valuation of forest ecosystem **Facilitating Rural Renaissance** • Rural income generation & poverty alleviation • Livelihood programme • Community –based relationship	**Food Security for All** • Setting targets for food crops • Changes in national food basekt as recommended by FAO • Special focus on small farmers

Economic Dimension	**Encouraging profitable and sustainable agricultural production** • Product market, food value chain • Non-food value chain **Enhance competitiveness** • Diversifying the agri production • Improving the value chains **Promoting physical and institutional market infrastructure** **Promoting new technologies** **Encouraging private-sector investment**	**Increasing productivity of crops** • Improve farm productivity level of major crops, wheat, cotton, sugarcane and oilseeds • Improvement in agronomic policies • Provision of quality seeds • To increase fertilizer use efficiency • Pest & weed management • Transfer of technology • Seed improvement • Fertilizer supply consumption • Projected fertilizer demand of 01 million ton and 1.5 million tons of DAP in 2010 • Withdrawl of GST on DAP • Amend agriculture pesticide rules • Promotion of agriculture export • Focus on small and medium farmers	**Enhance Productivity of Crops** • New technology development • High yielding disease resistant varieties • Scientific methods of farming **Efficient use of water** • High efficiency irrigation system • Precision land leveling **Promote Production & export of high value crops** **Enhancing the production of oilseed & tea** **Agriculture credit** **Improving market infrastructure** **Improve efficiency of inputs** **Strengthening research & extension** **Competitiveness**	• Public private partnership • Agri-trade negotiations at multi-lateral fora • Facilitating value addition & new value creation • Increase competiveness through SPS • Encouraging Corporate Farming Facilitating • Rural Renaissance through Entrepreneurship	**Green to Gene Revolution** • Recombinant DNA Technology • Germplasm enhancement **Transformation of subsistence agriculture to commercial agriculture** **Meeting WTO requirements** • Investment in transport and preservation technology

Environmental Dimension	**Integrated water resource management** **Land resource development & management** **Water policy summit** • Water saving techniques • Transferable water rights • Consumer awareness on safety and protection, env and water • Water pollution standards **Preparing for climate change & Bio-fuel** • Adjusting the cropping pattern • Crop rotation & diversifying • Adapting irrigation & fertilization regimes **Strategy for alternative fuel** • Support R & D from molasses &jetropha • Use of food sources will be discourages **National Land Use Policy** • Land use regulatory authority • Protect prime agri lands	• Fuel efficient and pollution free tractors • Promotion of low water requiring crops • Management of degraded land • Strategies for controlling erosion • Collection of data regarding conversion of land to urban areas. • Land use policy	**Conjunctive water use and management** • Sustainable development of land & water • Maintain health salt balance in soil **Promoting crops which require less water** • Reducing irrigated rice • Substitution with cotton, oilseeds & pulses • Area under sugarcane will be substituted with sugarbeet, sunflower & high value crops **Development of cultivable wasteland** **Controlling waterlogging & salinity**	**Optimizing disaster preparedness & emergency preparedness** • Disaster reduction & post disaster management • Controlling transboundary diseases • Food Quality & Safety Control • Watershed and landslide management •	**Integrated water resource management** • Most optimal use of water • Incentives for water saving technologies • Drought tolerant and water use efficient crop varieties • National biosaline agriculture program **Managing Natural Resource Base Adaptation to climate change** • Drought resistant varieties

It is worthwhile to mention here that land, water and soil are the three important interfaces highlighted by policy interventions. The climate change has been ignored in MTDF (2005-2010) as well as in NTMPF (2007-10) but considered in Draft National Agriculture Policy (2009-10). However, concrete measures to overcome this issue have been missing. Main targeting area is adapting shifting cropping pattern with no consideration of mitigation of greenhouse gases Air pollution, water pollution, agricultural waste, landscape, biodiversity has remained relatively ignored areas.

4.2 Relevant Environmental Policies

Policies that are related to both agriculture and environment are National Environment Policy (2005), National Sustainable Development Strategy, Climate Chang Policy (2013) and Biodiversity Action Plan

4.2.1 Pakistan National Environmental Policy, 2005

National Environmental Policy was approved in 2005 to provide an overarching framework for addressing environmental issues facing Pakistan particularly pollution of fresh water bodies and coastal waters, air pollution, lack of proper waste management, deforestation, loss of biodiversity, desertification, natural disasters and climate change. Thus, goal of national environmental policy as stated in the policy document is "to protect, conserve and restore Pakistan's environment in order to improve the quality of life of the citizens through sustainable development."

Agriculture and Livestock is one of the sector among nine other sectors for which environmental policy provide specific guidelines which are stated as below:

i) Ensure protection and preservation of Prime agriculture land from conversion to other uses through introducing land use planning and zoning
ii) Promote Organic Farming
iii) Prevent soil degradation and restore and improve degraded land
iv) Promote integrated pest management and discourage indiscriminate use of agrochemicals
v) Develop strategies and plans to tackle desertification in line with National Action Plan to Combat Desertification and Drought
vi) Establish National Desertification Control Fund
vii) Encourage ecologically compatible cropping systems

viii) Enhance existing livestock production through development of new technologies, scientific methods of farming and improved management interventions

ix) Promote recycling of agriculture products associated with livestock production and use of livestock sector as an outlet for recycling of appropriate urban wastes

x) Encourage highly productive breeds of livestock

xi) Introduce adequate animal waste management system in peri-urban dairy colonies.

4.2.2 National Sustainable Development Strategy (NSDS) of Pakistan (2009)

National sustainable development strategy was launched in 2009 with a vision "to evolve a harmonious society in the country that promotes avibrant and equitable economic growth without unbridled exploitation of resources and with due cognizance of distribution of development dividends to all; in particular to the poor and vulnerable in the society and future generation." One of the NSDS objectives is to review policies and programmes in line with three dimensions of sustainable development. The NSDS documents 20% share in annual environmental degradation cost i.e. 70 billion rupees annually because of reduced agricultural production due to land degradation. Strategy proposed is as follows;

- The Government will aim for plugging the inefficiencies and promoting sustainable production in the agriculture sector focusing on improving the irrigation water use efficiency, optimal fertilizer use, diffusion of water conservation, improving water storage and rain water harvesting , encouraging on farm water management, Integrated Pest Management, Integrated Nutritional Management as well as on-farm waste management.
- The concept of organic farming needs to be encouraged along with biological control of pests through Integrated Pest Management (IPM) techniques, rationale use of agrochemicals as well as promotion of indigenous and non-hybrid variety of seeds.

4.2.3 National Climate Change Policy of Pakistan (2012)

The national climate change Policy provided a framework for addressing the issues that Pakistan Faces or will face in future due to the changing climate. The policy was approved in 2012 and launched in 2013 provides a comprehensive framework for the development of Action Plans for national Efforts on adaptation and mitigation. The goal of policy is "to ensure that climate change is mainstreamed in the economically and socially vulnerable sectors of the economy and to steer Pakistan towards climate resilient development." Policy

provides a framework for the development of action plans for national efforts on adaptation as well as mitigation in all major sectors of economy. Agriculture and livestock is among one of the sectors for which adaptation and mitigation measures have been enlisted in the document and summarized below;

4.2.3.1 Policy Measures for Adaptation

Policy measures were provided under three main headings of i) Research, ii) technology, iii) General Management and iv) Risk Management. Policy measures proposed under these heading are mainly related to;

- Research related to assessment of climate change impacts, high yielding, drought tolerant, heat resistant crop & livestock varieties, ideal crop patterns, sustainable land management and capacity building of relevant organization and farmer community.
- Technologies to improve crop productivity, increasing efficiency of agricultural inputs, energy efficient farm mechanization, crop diversification, laser land leveling, solar water desalination, remote sensing and GIS based temporal changes in land cover, promoting biotechnology of more carbon responsive crops and livestock.
- Establishment of climate change units, horizontal expansion of cultivable lands, rainwater harvesting, feed conservation techniques and promoting enabling financial environment for farmers to invest in relevant technologies.
- Develop risk management system including crop insurance to safeguard against crop failures due to extreme events, improving extension system and enhance use of media, timely climatic prediction, agriculture drought management and livestock disease monitoring and surveillance systems.

4.2.3.2 *Policy Measures for Mitigation*

Agriculture and livestock sectors accounted for about 39% of Pakistan's total Greenhouse Gas (GHG) emissions in 2008. These emissions were essentially all methane (CH_4) and Nitrous Oxide (N_2O), 79% and 21% respectively originating from four sub-sectors; 1) enteric fermentation in cattles, 2) rice cultivation, 3) release of N_2O from agricultural soils and 4) manure management. These emissions grew at the rate of 3% per annum during 1994-2008. To mitigate and minimize these emissions following measures have been proposed;

- Promote indigenous knowledge and latest technology for ecologically sustainable green revolution
- Better management practices to reduce the use of chemical fertilizer, water and pesticides
- Reduce release of nitrous oxide from agricultural soils by changing mix of fertilizers commonly used
- Promote use of green manure, better manure storage and management
- Promote biogas and manure digester for methane production through CDM support
- New livestock breed with lower methane production
- Use of appropriate feed mixes and additives to reduce methane production
- Manage water in rice paddies to control release of methane, introduce low water demanding rice varieties
- No till farming
- Promote crops used for biofuel production without threatening the food security
- Develop capacity of relevant organization

4.3 Screening of the National Agriculture Policy (2009-2010)

Strategic Environmental Assessment is not a regulatory requirement in Pakistan unlike Environmental Impact Assessment which is compulsory for development projects covered under Schedule II of Review of IEE/EIA Regulation 2000. Therefore, categorization of government proposal under the scope of SEA as well as guidance related to SEA implication area is missing. To identify area of concern for SEA and to assure that agriculture policy has significant policy implications which require SEA, checklist of Danish Guidance on Environmental Effect for Government Bill or Proposal (Partidario, 2004) was used. For the purpose of screening only policy measures proposed under National Agriculture Policy (2009-10) were considered keeping in view the fact that policy claims itself be based on other four strategic documents. Result of the screening activity is presented in Table 4.2 highlighting area of significant concern;

Table 4.2 Checklist for environmental effects of the agriculture policy

	Is the policy believed to cause a change in or an effect on:				
		Significant	Should be examined	Minor Significant	Insignificant
1.	**Water** Surface Water Discharges of organic or inorganic substances, including toxic substances, into lakes and watercourses? Groundwater Percolation	\- Fertilizer Runoff Water Demand	Percolation rate, Eutrophication		
2.	**Air Pollution** Emission in to the air		Carbon sequestration	\- ($PM_{2.5}$& PM_{10})	
3.	**Climate** Emission of GHGs	\- (39% share in total GHG)			
4.	**Surface of the earth, soil and percolations** Surface of the earth, soil and percolations	\- Land degradation,			
5.	**Flora, fauna, including habitats and biodiversity** The number of wild plants or animals of any species or the distribution pattern of species?	\- Invasive species Habitat fragmentation Reduced species diversity	Effect not studied so far		
6.	**Landscapes** The total area or the land use within areas used, e.g, for farming, towns, industrial plants and installations as well as forests or coastal & natural areas (dunes, heaths, bogs, etc.)?		Effect not studied so far		
7.	**Other resources** Cultivation, cutting, catching or use of renewable resources, e.g. trees, fish or wildlife?	\- Effect on mangrove & fisheries			
8.	**Waste** Wastes, residues or quantities of waste disposed of, incinerated, destroyed or recycled?	\- Organic Waste Faecal pathogens Pesticides	Total agriculture residue		
9.	**Historical buildings** Buildings and historical monuments which require repair because of a change of the groundwater level or air pollution?				\-
10.	**Population** Acute and/or long term health risk (including mental health) in connection with food, drinking water, bathing water, soil, air, noise or handling of hazardous or toxic substances etc?	\+ (ensure food security)	Food availability Toxicity Water, food & soil contamination		
11.	**Prodution, handling or transport of hazardous or toxic substances** Risk of fire, explosions, breakdowns or accidents and emissions?	\- (pesticide handling)	Pesticide toxicity to farmers Accident Rat		

Key + Positive -Negative

As clear from the table 4.2, water in terms of quantity as well as pollution of water bodies, climate change, land degradation, effect on natural areas and species are the main areas of concern which might be affected negatively due to intensification of agriculture as areas for extensification are already limited. According to Scottish Executive report (2005) mentions diffuse pollution, biodiversity and landscape as priority issue needs to be addressed by policy. SEA conducted for Scottish Next-Step Strategy for Agriculture also highlights biodiversity, climate change, land degradation, water, landscape, natural heritage as areas of concern for integrating SEA objectives. Global warming, eutrophication and biodiversity depletion were identified direct impacts of agriculture in Sweden (Engstrom*et al.*, 2007).

However, agricultural growth on the other hand will provide food security, employment and thus will improve quality of life. For some of the effects indicators data is missing for example little is known about the extinction or threats to species due to agricultural practices or effect on historical buildings. It is important to provide existing of Pakistan's agriculture and related environmental parameters to anticipate future impacts.

4.4 Baseline Condition

In the absence of any baseline period and quantitative targets in plans and policies, baseline conditions are mainly extracted from secondary data mainly from agricultural statistics, economic survey reports and researched carried out in the last decade (2001-2013). Pakistan Strategic Country Environmental Assessment Report (2006) identified that agriculture and the environment are inextricably linked and that the industry has the potential and opportunity to bring increased environmental benefits.

The study of relevant literature shows that the green revolution or conventional agricultural system has remained pervasive in Pakistan since development of MTDF and Vision 2030, which propose a paradigm shift from green to gene revolution. Before the start of 21st century efforts are being pursued to promote the green revolution technologies to cope with theevergrowing demand for food grain. Scientific research findings on conventionalagriculture have revealed that this type of agriculture has enabled farmers to fulfilltheir immediate needs at the cost of environmental degradation, thereby threateningthe sustainability of agriculture itself as well as the health of people consuming its products (Rasul&Thapa, 2004).

4.4.1 Agriculture Performance

The agriculture sector continues to be an essential component of Pakistan's economy. It currently contributes 21 percent to GDP. Agriculture generates productive employment opportunities for 45% of the country's labour force and 60% of the rural population depends upon this sector for its livelihood. During 2011-12, the overall performance ofagriculture sector exhibited a growth of 3.1 percent mainly contributed by significant growth in major crops is contributed by rice, cotton and sugarcane by 27.7 percent, 18.6 percent and 4.9 percent, respectively.

Table 4.3: Agricultural Growth from 2005-2011

Year	Agricultural Growth rate
2005-06	6.3%
2006-07	4.1%
2007-08	1.0%
2008-09	4.0%
2009-10	0.6%
2010-11	2.4%

(Source: Economic Survey of Pakistan, GoP, 2011)

4.4.1.1 Agriculture output

An increasing trend of yield in food crops has been observed from 1981 to 2009 as clear from the figure 4.2 below;

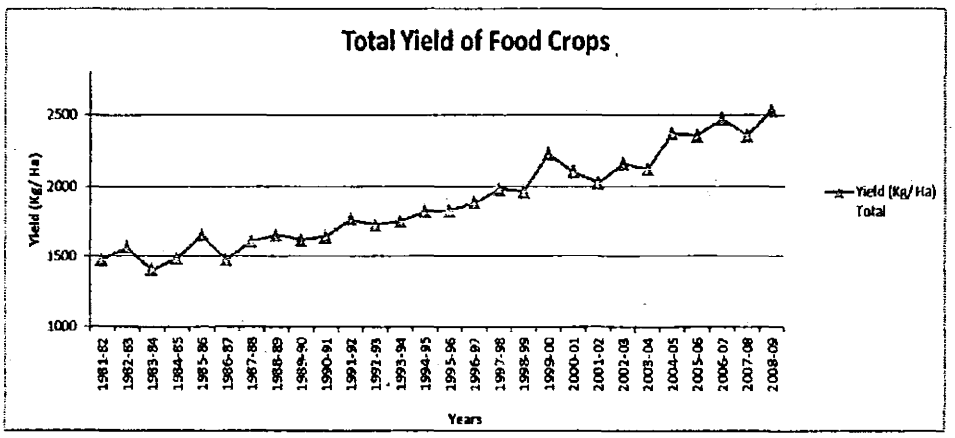

Figure 4.2: Total Yield of Food Crops (1981-2009)
(Source: Economic Survey of Pakistan, GoP, 2010)

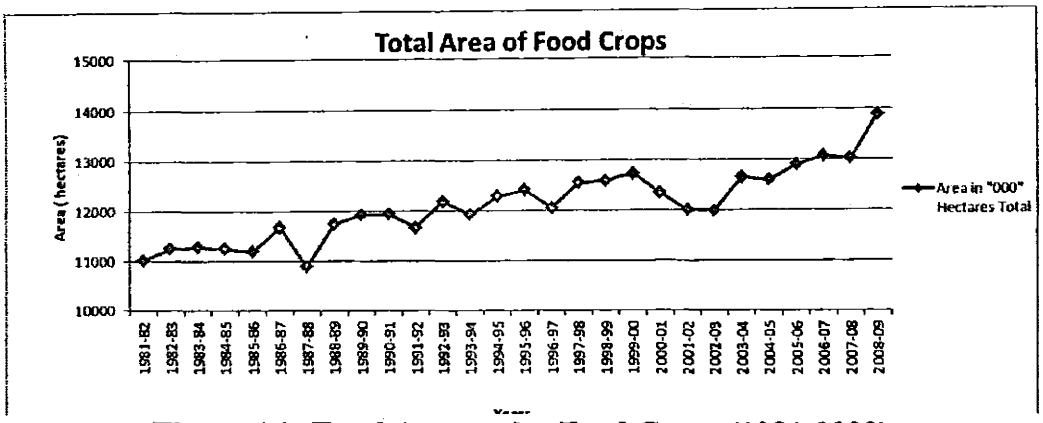

Figure 4.3: Total Area under Food Crops (1981-2009)
(Source: Economic Survey of Pakistan, GoP, 2010)

For the same period however, total area under food crops did not show any significant increase. During the last thirty years only 2 million ha of land has been added in total agriculture land which suggests intensification strategy for agriculture production. Four major crops, wheat, rice, cotton and sugarcane add 29%, minor crops add 10.1% and livestock contribute 55.1% to the total value added to agriculture. Trend in total production of major crops has been presented in figures 4.4 to 4.7;

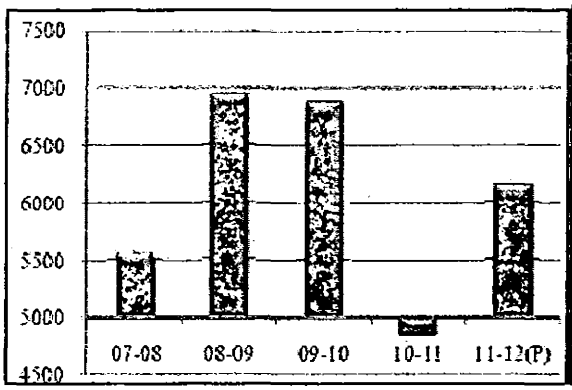

Figure 4.4: Rice Production

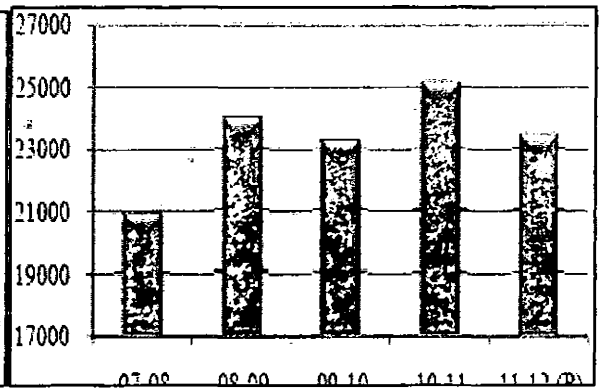

Figure 4.5: Wheat Production

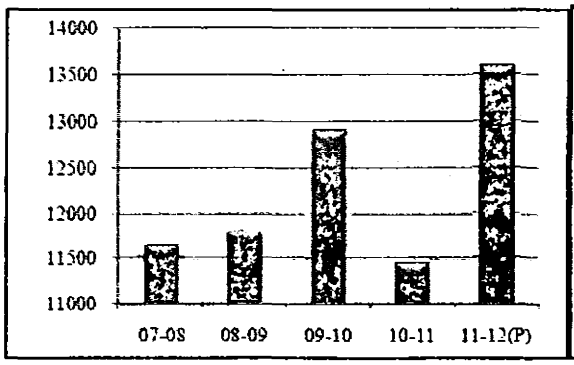

Figure 4.6: Cotton Production

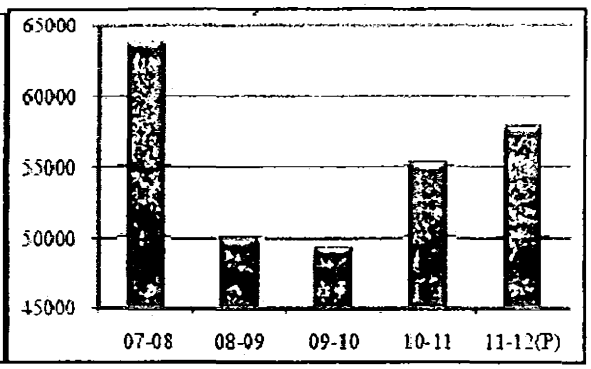

Figure 4.7: Sugarcane Production
(Source: Economic Survey of Pakistan, GoP, 2011)

Historically livestock has remained a subsistence source of income for small famers and land less poors. However due to government policies livestock has shown considerable growthas clear from the table below:

Table 4.4: Livestock Population in Pakistan (2009-2012)

Species	2009-10[1]	2010-11[1]	2011-12[1]
Cattle	34.3	35.6	36.9
Buffalo	30.8	31.7	32.7
Sheep	27.8	28.1	28.4
Goat	59.9	61.5	63.1
Camels	1.0	1.0	1.0
Horses	0.4	0.4	0.4
Asses	4.6	4.7	4.8
Mules	0.2	0.2	0.2

(Source: Economic Survey of Pakistan, GoP, 2011)

4.4.1.2 Availability of Farm Inputs

Fertilizer

It is most important and expensive farm input in Pakistan. Use of balanced fertilizer use has a capacity to increase agriculture production by 30-60% in different crop production areas of the country. Fertilizer consumption has shown an increasing trend till 2005 when all subsidies on the fertilizer has been removed. After 2005 graph shows decline due to rise in fertilizer prices

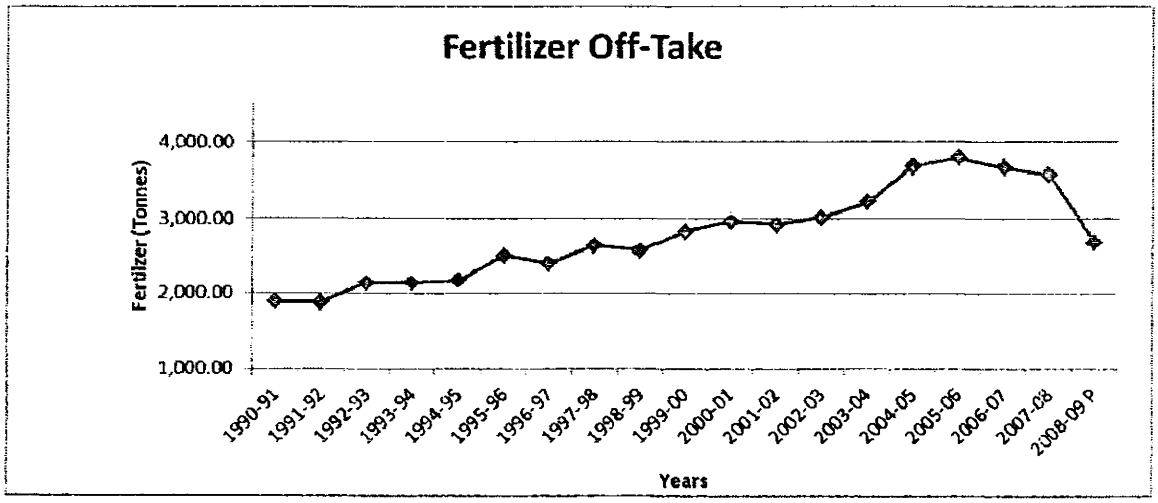

Figure 4.8: Total Fertilizer offtake (in tons) (1991-2009)

In recent years, an indirect subsidy has been provided to fertilizer sector in the form of reduced gas prices for fertilizer manufacturing industry by Presendital Order of Mr. Asif Ali Zardari in 2008. Details of subsidies provided to fertilizer manufacturing industries from the year 2008-09 uptill 2012-13 has been presented in Table

Table 4.5: Subsidies provided to Fertilizer Sector under Budget (2008-2013)

	Budget (Rs. In Million)							
Classification		Revised	Budget	Revised	Budget	Revised	Budget	Revised
	2012-13	**2011-12**	**2011-12**	**2010-11**	**2010-11**	**2009-10**	**2008-9**	**2008-9**
Fauji Fertilizer Bin Qasim	3,400	162	162	185	185			
Subsidy to TCP for import of Urea Fertilizer	26,000	44,982	12,000					
Manufacturers of PhosphaticPottasic Fertilizer				800	0			
Imports of PhosphaticPottasic Fertilizer				200	0			
TCP for import of Urea Fertilizer				4,000	0			
Subsidy to manufacturers of PhosphaticPottasic Fertilizer					800			
Subsidy to TCP for import of Urea Fertilizer					4,000			
Subsidy to Importers of Phosphatic and Pottasic Fertilizer			0	0	200			
Import of Urea Fertilizer						10,000	3,000	3,000
DAP Fertilizer						0	21,037	12,000
Import of Phosphatic&Pottasic Fertilizer						0	7,625	20,000

(Source: Budget Statements 2008-2012, GoP, from various document 2008-12)

Water

An efficient irrigation system is prerequisite for higher agricultural production as it helps in increasing agricultural productivity. Total withdrawl for agriculture sector for the year 1991 to 2009 has been presented in the table.

Improved Seed

Seed has a unique position among all agricultural inputs as the effectiveness of all other inputs depends upon the quality of seed. Provision of good quality seed has remained objective of all agriculture policy documents. Performance on this sector has been presented in the table

Agriculture Credit

Pakistani farmers often lack finances thus provision of credit on flexible conditions can play a remarkable role in overall development of the sector. A well-established network of leading institutions works for the meeting this demand of farmers. Currently 26 commercial and microfinance banks, with 39000 agriculture designate branches are facilitating farmers. Amount of credit disbursed during 1990-91 to 2011-12 has been presented in table shows a remarkable increase from Rs. 14,915 million to Rs. 197,361 million respectively.

Table 4.6: Agriculture Inputs (1990-2012)

Fiscal Year	Cropped Area (million hectares)	Improved seed dis-tribution (000 Tonnes)	Water* Availa-bility (MAF)	Fertilizer off-take (000 N/T)	Credit disburse (Rs millio
1990-91	21.82	83.27	119.62	1892.90	14,915
1991-92	21.72	65.93	122.05	1884.00	14,479
1992-93	22.44	63.93	125.12	2147.61	16,198
1993-94	21.87	63.27	128.01	2146.80	15,674
1994-95	22.14	76.87	129.65	2183.10	22,373
1995-96	22.59	145.10	130.85	2515.05	19,187
1996-97	22.73	137.67	132.05	2413.01	19,548
1997-98	23.04	130.50	122.15	2646.00	33,392
1998-99	22.86	167.38	133.78	2583.00	42,852
1999-00	22.74	194.30	133.28	2832.00	39,688
2000-01	22.04	193.80	134.77	2964.00	44,790
2001-02	22.12	191.57	134.63	2929.00	52,314
2002-03	21.85	172.02	134.48	3020.00	58,915
2003-04	22.94	178.77	134.78	3222.00	73,446
2004-05	22.78	218.12	135.68	3694.04	108,733
2005-06	23.13	226.07	137.98	3804.00	137,474
2006-07	23.55	218.60	137.80	3672.00	168,830
2007-08	23.87	264.67	137.80	3582.00	211,561
2008-09	24.01	314.63	131.51	3710.00	233,010
2009-10	23.76	312.63	133.70	4360.00	248,120
2010-11	22.75	331.02	137.16	3933.00	263,022
2011-12 P	22.75	331.02	135.86	2913.00	197,361

(Source: Economic Survey of Pakistan, 2011-12, GoP, 2012)

4.4.2 Environmental Performance

Like most developing countries, Pakistan faces serious environmental problems. Rapid population growth (averaged about 3 percent a year since the early 1970s) and impressive GDP growth (of about 6 percent a year) have put enormous pressure on the country's natural resource base and have significantly increased levels of pollution. Soil erosion and salinity have caused crop yields to decline in some areas on what were previously some of the most productive soils in Pakistan Environmental problems are often caused or exacerbated by inappropriate policies that provide incentives for practices detrimental to the country's natural resource base. In Pakistan, for example, subsidies on some agricultural inputs have caused damage to the environment.Especially damaging has been the provision of irrigation water at prices substantially below the cost of delivery, a policy that has increased waterlogging, led to the loss of many mangrove forests in the coastal areas, and diminished biodiversity. The former policy of subsidizing agricultural chemicals led to excessive use of pesticides. The policy of providing energy (such as electricity and diesel) at below-market price provides incentives to individuals to overuse the natural resource base.

4.4.2.1 Population

Pakistan covers an area of 76.9 million ha supporting a population 180.71 million people, with almost 1 13.61 million of them living in rural areas in 2011-12 (GoP, 2012). As the table shows that the population in urban areas increased from 65.28 million in 2011 to 67.55 million in 2012.

Table 4.7: Urban and Rural Population (Million)

Mid year	Urban Population	Rural Population
2008	57.32	105.06
2009	60.87	109.07
2010	63.05	110.46
2011	65.28	111.82
2012	67.55	113.16

(Source: Economic Survey of Pakistan 2011-12, GoP, 2012)

4.4.2.2 Employment

Most of the labor force (45%) in Pakistan works in rural areas where agriculture is the dominant activity. The total labor force working in agriculture does not show any change, but a slight increase in female workforce (74% to 75.4%) and a declining trend in male workforce (37.3-36.2)between 2008-2011 (GoP, 2012).

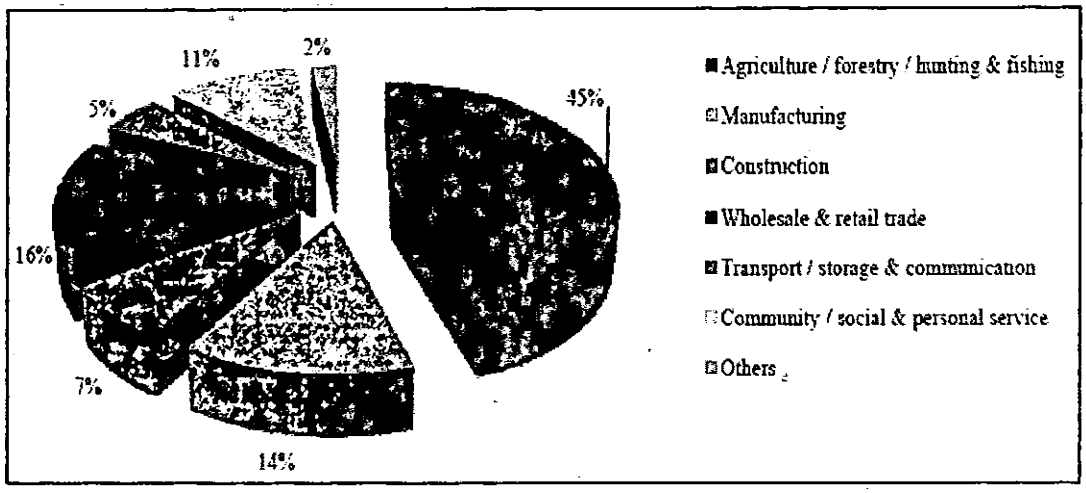

Figure 4.9: Industry-wise employment share
(Source: Economic Survey of Pakistan 2011-2012, GoP, 2012)

A larger share (76.2% in 2008-09 to 76.5% in 2010-11) of rural employment is in informal sectors which are relatively lower paid. Females are more affected by these low paid jobs.

4.4.2.3 Biodiversity

Any changes in the nature, level and location of farming could have a significant impact on biodiversity. An increase (4.5% in 2004-05 to 6% in 2009-2010) trend in forest cover has been observed, however area protected for conservation has not changed i.e. 11.3% between the years 2004-2011. For achieving Millennium Development Goals Target (MDGs) target, the area under protection should be 12% by the year 2015. No significant quantitative data exist to measure loss of biodiversity or habitat due to agriculture practices. Only documented relationship between the two is in the form of water extraction, soil erosion and toxic pollution due to intensification of agriculture. Adverse impact on mangrove forest has been reported due to reduced water supply downstream Kotri Barrage. Beside this, Biodiversity Action Plan (BAP), (2000) also documents agricultural practices like intensification, use of pesticides, waterlogging and salinity etc that are harmful for soil microorganisms,

invertebrates, and reduced biodiversity on agricultural land. Uniformity of cultivars has been recognized as major threat that leads towards eroding of agro-biodiversity (GoP, 2000).

4.4.2.4 Invasive Alien Species

The effect of exotic species on the native fauna and flora of Pakistan has not been well documented. In attempts to meet the increasing demands of a rapidly growing human population, fast growing exotics have been introduced to alleviate shortages in timber, fodder and fuelwood. Prominent tree species includeeucalyptus, hybrid poplar and Paulownia planted on farmlands and irrigated plantations. Many primitive landraces/cultivars and wild relatives of agricultural crops (such as wheat, rice, pulses sugarcane and cotton) have suffered from genetic erosion from the introduction of HYVs of these crops, habitat degradation and the excessive use of pesticides and herbicides. As the genetic traits of local species are lost, the ability to adapt to local environments and climates, and to tolerate diseases is greatly reduced (GoP, 2000).

4.4.2.5 Air Quality& Climate Change

The agriculture and livestock sectors are potentially significant sources of methane (CH_4) and nitrous oxide (N_2O) emissions.Possible source sectors include enteric fermentation in domestic livestock, manure management practices, flooded rice fields, prescribed burning of savannas, field burning of agricultural residues and emissions from agricultural soils. Total CH4 emissions from enteric fermentation and manure management amounted to 3,667.4 Gg in 2007-08. Fifty percent of these emissions came from the buffalo population alone, with cattle (both dairy and non-dairy) accounting for a further 28 percent.Ammonia contributes in high level of PM10 due to chemical transformation in air (Scottish Executive, 2007)

Methane emissions from paddy fields estimated at approximately 155.0 Gg. Emissions from field burning of agricultural residues remained low in 2007-08. Emissions were estimated at 12.9 Gg of CH_4, 361.1 Gg of CO, 0.34 Gg of N_2O and 12.3 Gg of NO_X.Total direct emissions of N_2O from agricultural soils were obtained by adding direct soil emissions from agricultural fields (i.e., emissions from synthetic fertilizer, animal waste, nitrogen fixing crops and crop residue) and direct emissions from histosols. Thus total direct N_2O emissions were estimated at 51.8 Gg (Khan *et al.*, 2010). Thus share of agriculture sector in total GHG emission is 39% as documented by greenhouse gas emission inventory of 2008.

4.4.2.6 Water Availability

Pakistan's agricultural output is closely linked with the supply of irrigation water. Against the normal surface water availability at canal heads of 103.5 millionacre feet (MAF), the overall (both for Kharif and Rabi) water availability has been less in the range of 5.9 percent (2003-04) to 20.6 percent (2004-05). However, it remained less by 2.5 percent in 2005-06 against the normal availability (GoP, 2008).

4.4.2.7 Land Degradation

As reported by Pakistan Country Strategic Environmental Assessment Report (2006), land degradation is a serious concern for Pakistan has soil erosion has increased due to anthropogenic factors about 18 million ha between the years 1993 to 2003. Figure shows percentage distribution of eroded land by province. Eroded land results in low yields causing economic loss of Rs. 15 billion per year or 0.25% of GDP.

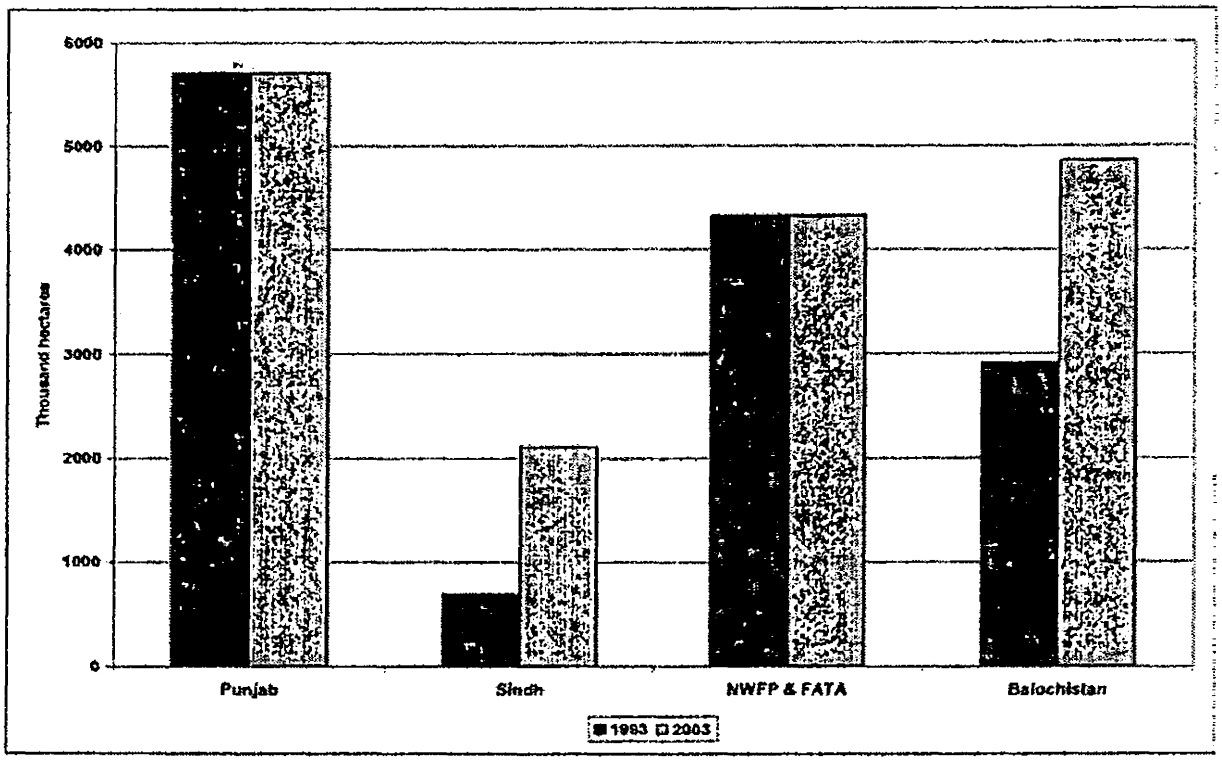

Figure 4.10: Eroded land in Pakistan (1993-2003)
(Source: Pakistan Country Environmental Assessment Report, GoP 2006)

Area affected by the intensity of wind and water erosion and their percentage coverage at two different times is shown in the two tables given here,

Table 4.8: Area affected by wind erosion in Pakistan

Intensity of Erosion [Class]	1998	2007
	Area (Mha)	Area (Mha)
Slight to Moderate Erosion	2.595	1.29
Moderate to Severe Erosion	0.496	9.456
Severe to Very severe Erosion	1.668	2.282
Total	4.759	13.028

(Source: Land Use Atlas of Pakistan, GoP, 2013)

Table 4.9: Area Affected by Water Erosion

Intensity of Erosion (Class)	1998	2007
	Area (Mha)	Area (Mha)
Slight to Moderate Erosion	3.979	5.165
Moderate to Severe Erosion	3.581	20.003
Severe to Very severe Erosion	3.745	17.677
Bank Erosion	-	2.282
Total	11.305	45.127

(Source: Land Use Atlas of Pakistan, GoP, 2013)

4.4.2.8 Soil Salinity

Salinity is common in most of the arid regions of the world, but in case of Pakistan it has been compounded by other factors like consistent mismanagement of irrigation practices and human induced soil erosion. Over 25% of irrigated land suffers from various level of salinity out of which 1.4 million ha is uncultivable (GoP, 2012).

It is clear from above discussion that Pakistani agricultural production has increased as a result of an increase in both crop yields and area under cultivation. But some of the policies that spurred this growth have been damaging to the environment, either because they were not economically appropriate (the pricing of water, for example), or not accompanied with corrective policies for environmental protection. Irrigation of the Indus Basin, for example, has increased salinity and sodicity of the soil, and destroyed many of the riverine forests and associated flora and fauna species. The system has also led to the loss of many mangrove forests in the coastal areas and to an associated decline in biodiversity and the fishing economy. Agricultural run-off from fields to which chemicals have been applied incorrectly or inappropriately has raised the levels of toxics in the waterways. Had appropriate policies

been adopted, agricultural growth could have been achieved with less damage to the environment.

4.5 Strategic Environmental Assessment Objectives

With respect to issues highlighted above and also in screening activity, SEA objectives were developed and refined in consultation with the experts. Table shows the SEA objectives define with respect to abovementioned issues in conjunction with the criteria assessment questions which were addressed during predicting environmental effects of the proposed policy;

Table 4.10: SEA Objectives and Assessment Questions

	SEA Objective	Assessment Question Will the strategy.....?	Categories
1	Reduce soil degradation and contamination through promoting sustainable agricultural practices	Reduce soil degradation? Reduce contamination from agrochemicals Promote sustainable soil management?	Soil
2	Ensure Sustainable and Integrated Water Resource Management	Ensure sustainable abstraction from surface and ground water? Promote the efficient use of water and water recycling?	Water Quantity
3	Reduce water pollution resulting from diffuse agricultural pollution	Promote the efficient and safe use of fertilizers, organic manure and pesticides? Promote the use of measures to reduce runoff from agricultural land including buffer zones? Promote nutrient budgeting?	Water Pollution
4	Reduce greenhouse gas emissions related to production	Reduce emissions to air of agricultural production?	Climate/Air
5	Reduce vulnerability to the effects of climate change	Reduce the vulnerability to flooding? Reduce vulnerability to increase in temperature? Increase resilience to climate change? Protect carbon sinks including wetlands.	Disaster Risk Management
6	Promote the reduction, reuse and recycling of all resources	Encourage the minimisation of waste during farm management, harvesting, transportation and processing? Promote composting and energy recovery? Support measures to realize agricultural waste and by-products as raw materials for other industries?	Waste
7	Promote sustainable livelihoods to enhance the viability of rural community and particularly small farmers	Promote sustainable livelihoods? Increase the viability of rural communities and small farmers? Promote effective contingency planning for major incidents and biosecurity hazards?	Human health/Population

(Adapted from Scottish Executive 2007)

Based on the above mentioned SEA objectives and assessment questions, and review of measures proposed under National Agriculture Policy 2009-10, anticipated environmental impacts were identified and presented in the form of simple matrix under table. Impacts were divided in positive, negative, mix and unknown with the temporal nature of impacts.

Table 4.11: Anticipated Impacts of National Agriculture Policy (NAP), 2009-10 on SEA Topics

Key

Significant Positive Impacts	Minor Positive Impacts	Mixed Impact Positive/negative	Neutral/ unknown	Minor Negative	Significant Negative
+ +	+	+/-	?	—	– –

SEA Topic / Proposed Policy Actions NAP 2009-10	Soil	Water Quantity	Water Quality	Climate/Air	Disaster Risk Management	Waste	Human Health /population	Comments
Focus on product market of Food Value Chain **Wheat** (Buffer Stock management, Private Sector Participation) **Rice** (copyrights of basmati Rice, controlling adulteration) **Sugar Cane** (contract b/w grower & mills, conversion of baggase and molasses to bio-energy **Horticulture**, (fruits & vegetables) incentives, transport & storage, inspection & control of chemical residue	– –	– –	– –	–	–	+	++	Focus on enhancing productivity will encourage intensification, diversification of crops may encourage exotic species Ensure food security
Focus on product market of Non-Food Value Chain **Cotton-textile** (Bt cotton seed, standardization & grading, provincial cotton control act, Research on impact of WTO agreements) **Edible Oils, Oilseed crops & Biogas** (Quality control of Banaspati ghee, import substitution policies, alternative fuel, Development of local oilseeds & dairy sector	+/-	?	–	–	–	+/-	+	Change entails adaptation to both market conditions and long-term climate change that may inhibit the production of some crops but introduce opportunities for others.
Resource Based Factor Markets **Land Market** (policy on land resource development, efficient land market,institutions for lease/rental land contracts) **Water & Irrigation** (Water policy summit, provincial water related legislations, reliable data for surface & groundwater, smart subsidies **Labor Market**(Roadmap for human resource development of rural economy, labor skill development in value chains, irrigation, harvesting, veterniary	+/-	+	–	?	?	?	++	Suggested measure focus water quantity issue with no measure suggested for water quality. Although proposed measures will improve labor market however measures to reduce rural-urban migration & shift from agri-based livelihood needs to be addressed

Other Factor Market **Science & technology based** (roadmap on research & development, research on killer diseases, grading & quality standards, rationalization of duty surcharges on grading, low cost processing technology, budgetary share to be enhanced to 3%, IPR, patent laws. **Agriculture Extension** (Improved agronomic practices, roadmap for R & D extension, technology transfer facilitation, Sodic/saline water treatment technology) **Rural Finance** (Rural finance strategy, credit management, review of existing govt./private funded mechanisms, commodity exchange, crop insurance schemes) **Water Conservation Technology** (reviewing existing tariffs, incentive on water saving technologies, standardization, regulations of agriculture machinery) **Variable Inputs**(review of subsidy policy for phosphate & potash fertilizers, review of pesticide act, seed certification laws, reduction in import duties for good quality wax) **Market Infrastructure**(market infrastructure plan, Horticulture market infrastructure policy, reduction in import duties of re-conditioned vehicles, special purpose corporate vehicles, export procedures for perishable goods.	+/-	++	--	-	++	?	++	Policy actions focus on subsidy on chemical fertlizers rather promoting organic farming Promotion of re-condition vehicle on one hand make them accessible to small farmers but on the other hand will result on other hand will result in increased level of air emissions.
Institutional Reforms and Capacity Building **MINFAL related interface** (facilitate private sector run networks, partnership and alliances, policy skills on regulatory harmonization, strategic alliance with international supermarket, rationalize duplicating agri/rural functions.	?	?	?	?	+	?	+	Coordination among departments will avoid duplication of task and will reduce financial constraints however exact role needs to be studied
Water Related Agencies (Integrated water resource management, capacity building plan, formation & strengthening of Area Water Boards	+/-	++	++	?	+	?	+	Help improve water quality and quantity, effect on other areas needs to be further studied
Capacity Building **Subsistence to Commercial farms** (Policy dialogue for existing & prospective supply chain network, training needs on ISO, GMP, GHP, HACCP etc., Farmer organizati0n	?	?	?	?	-	-	+	Training help farmers to be competitive but areas do not consider disaster preparedness, IPM etc actual need of the farmers.
Public-Private partnership for Strategic Value Chain Development & Capacity building (rice quality control, business capacity development, improve development of agri-practices, federal seed certification & registration department	?	?	?	?	?	?	+/-	Federal level certification could be a matter of concern for provincial agencies particularly after devolution

Consumer Awareness on Safety and protection, environment and water use(awareness program on economic value of water, local aquifer conditions, risk of exploitation, water conservation and need for management, understand linkages between water, sanitation, health & productivity, need for water quality enforcement measures, social mobilization to develop local groundwater regulations, public awareness on adaptation & mitigation measures.	+/-	++	++	?	+	?	?	Awareness concentrate on water and climate change while the rest of areas particularly related to chemical handling on farm, occupation hazards, simple water saving techniques, etc missing
Infrastructure Investment Through Public-private Partnership(PPP) **Land Registration and Land Titling** (updating land records through GIS/RS, institutional mechanism for dispute resolution, **Rehabilitation & Construction of Canals** (rehabilitation of irrigation system and linning of canals, construction of major dams) **One-Stop Processing of Basmati Rice in PPP mode**	++	++	+/-	?	+/-	?	+	Land zoning and its enforcement to stop usage of agricultural land for residential purposes Construction of dams will help reduce flood but other types of disasters will remain threat
Food Safety Quality Standards and Agro-Meteorology (appropriate no. of laboratories, Public health infrastructure for food safety and consumer protection, infrastructure for prevention, identification and eradication of plant pests, certification facilities for fruit nurseries & vegetable seeds, modern weather collection equipment,	?	?	?	?	?	?	++	Improve health of consumers Agro-climatic zoning needs to be done.
Market infrastructure for private sector investment (infrastructure and logistic centres, trade promotion activities, universal cotton grading standards, bulk storage facilities, Commodity exchange, market information portals	?	?	?	?	?	?	?	
Divestment of Public Owned Facilities (inventory and audit of state-owned purchase centres, godowns storage facilities, action plan for purchase of various mills	?	?	?	?	?	?	+	
Protecting the Environment and preparing for climate change **Environmental Protection and Land Desertification** (Formulation of water pollution standards, marine Pollution Act, proper waste management particularly recycling and reusing the waste, collaboration with formulators of forest policy for soil conservation, and conservation of biodiversity. **Preparing for Climate Change** (Adjusting the cropping pattern, crop rotation and diversifying crop mix, climate change responsive varieties, adapting irrigation practices and fertilization regimes Bio-Fuel (R & D efforts to develop bio-fuel from molasses and jetropha, use of food sources in developing biofuels would be discouraged	++	++	+	+	?	++	++	Efforts focus climate change adaptation while 39% share of agriculture sector in GHGs emissions will be undermined if no actions are being proposed.

Gender Mainstreaming Women access to resources and assets including ownership and remuneration, Enabling legislative framework to eliminate structure inequality, gender disaggregated operation research for effective planning	?	?	?	?	?	?	++	Although a direct linkage between the environmental and agricultural factors could not be established here, however women are known to be good environmental manager
Urbanization (reliable data on level of urbanization, national land use policy considering marginal land for non-farm uses	++	+	+	+	+	?	++	Ensure food security by protecting prime agricultural land, help protect watershed etc
Farmers Right (land rights-protection of prime farm land, right to conserve, reproduce and modify seed and plant, right to ensure food security, right to just agricultural prices & public support, right to information on WTO agreements, Right to participatory research, right to natural resources, right to safety and health, access to credit.	?	?	?	?	?	?	+	

In case of SEA for sectoral policy, it was not possible to predict and identify the exact nature, location or extent of environmental impacts. Therefore, proposed action was reviewed to identify potential impacts, both positive and negative, and to recommend possible means of mitigation or enhancement. In order to identify environmental effects, the actions were assessed against a range of SEA topics and objectives, assuming that worst case scenarios were realized. For instance, making the assumption that focusing on business information to identify the most profitable areas would lead to intensified production and associated environmental degradation.

With respect to actions proposed under NAP 2009-10, positive impacts are expected from actions that are related to land resources management, integrated water resource management, consumer awareness and capacity building on safety, protection and environment, climate change adaptation and assessment of risk vulnerabilities. However, effectiveness of these policy measures is linked with the effective planning, monitoring and auditing. Capacity of building of the existing institutions will be a prerequisite to achieve these goals.

However, Table 4.11 clearly shows the gaps in the policy actions with respect to SEA objectives. The identified gaps are mainly related to utilizing potential of agriculture residue for energy production, climate change mitigation, disaster risk management, diffuse pollution, establishment and coordination of provincial department, harmonization in policy/regulation of all provinces. Faruqee (1995) had also identified these constraints for agriculture sector in Pakistan. According to Faruqee (1995) thesecond constraints can be divided in two categories i) policy distortion and ii) resource constraints. Resource constrains are then further divided into four categories; soil erosion and land degradation, second is distribution of land resources and system of land tenure, third is plagued irrigation while fourth is human resource and infrastructure.

Negative impacts are expected from the actions that are inclined towards corporate farming and targets on subsistence to commercial farming. Such trends may result is shifting of farmers to high value crops. Issue has been discussed by Faruqee (2012) which conclude that leasing large tract of land to multinational companies will eject small farmers and landless labors which only can be absorbed in low urban economy which already suffers from low productivity.

According to Byerlee (1994), Pakistan is now facing second post green revolution phase of productivity growth where improvement in input efficiency are the main source of growth. High yielding varieties have already been diffused widely and input use is at high rate. However, policy actions shows inclination towards agriculture market development by increasing agriculture production with little concern of sustainability e.g. policy actions propose review of subsidies for chemical fertilizers without mentioning the organic manure as better alternative for farm nutrient management. Such policy measures support intensification based on application of unbalanced amount of fertilizers resulting in salinity and eutrophication. According to Hossain& Singh (2000), plants uptake about 20-50% of the nitrogen, 15-20% of the added phosphorus and remaining is retained in soil. The study also shows that nitrogen losses are minimum when fertilizer is applied deep in the soil, use of inhibitors, coating of granules and provision of other nitrogen sources like organic manure.

However relationship of policy actions and consequent environmental impacts is not that much simple due to role of multiple players. Political interventions are among one of the player in determining ultimate policy. For example, although subsidies have been phased out in 2005 on fertilizers, but indirect subsidies in CNG are still applied due to presidential order of Mr. Asif Ali Zardari in 2008. Adverse impacts have also been observed due to increased abstraction of ground water after announcement of plain tariff rate for electrify of tube wells in Balochistan by General PervazeMusharaf just before referendum to gain political support.

Another key player in implementation of policy is coordination among departments i.e. between federal, between provincial and between federal- provincial. For example any measure proposed for achieving irrigation efficiency, developing storage etc cannot bring fruit until and unless coordination mechanism with provincial irrigation department has been designed. Importance of coordination has been increased manifold after 18th Amendment in 1973 constitution as now responsibility of food security and agricultural productivity is co-shared by Ministry of Food Security and Research at federal level and Agriculture departments at provincial level.

Chapter 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Present study was designed to identify impacts of National Agricultural Policy (2009-10) on environmental, social and economic fabric of Pakistan. The policy vision statement shows clear commitment of agriculture sector to improve quality of life of citizens through ensuring food security by developing an efficient and sustainable agriculture system. Policy document was thoroughly reviewed along with other strategic documents i.e Agriculture Perspective and Policy (2004), MTDF (2005-10), NMTPF (2007-10) and Vision 2030. Pakistan National Environmental Policy, 2005, National Sustainable Development Strategy (NSDS) and Climate Change Policy, 2012were also studied to identify environmental objectives of Pakistan for Agriculture Sector.

NAP (2009-10) provides a wide range of policy measures to increase efficiency, ensure sustainability and enhance competitiveness which include enabling framework for increasing production of food and non-food crops. Policy highlights water as limiting resource, while rest of the inputs like fertilizer, mechanization and labor although identified but not in strength as water has been discussed. Main areas of concern as identified Danish environmental checklist are soil-nutrient balance/ eutrophication, water quality, GHGs emissions, agricultural residue management, integrated pest management.

Actions proposed under policy, positively support food security, increasing productivity, crop diversification, land and water resource management, climate change adaptation, disaster risk assessment, farmer and consumer awareness on safety, protection and environment. While, it is predicted that focus on commercial and corporate farming and intensification of inputs will negatively impact the environment. Policy also addresses some of the emerging challenges pose by disasters and climate change. However response to these threats includes assessment of risk vulnerability, disaster preparedness without highlighting the role of capacity building of farmers as well as institutions.

Outcome of the measures suggested under policy is strongly linked with its implementation, monitoring and auditing and thus result in continuous improvement. This will require political will and consistency in policy. Provincial policies which are yet at draft stage should address these issues while suggesting measures that are specific to their conditions to maintain sustainability of the system.

5.2 Recommendations

Based on the review of policy documents and in consultation with experts following recommendations are being proposed in general;

1. Due to diverse type of cropping patterns, agriculture policy should be developed at provincial level. However, policies should be in harmony as strict standards in one area could divert investment from that area to other areas providing flexibility.
2. Minimizing the political interference in policy actions and strategic decisions related to agriculture and environment to ensure consistency in the policies.
3. Policy should focus on rural development including social sector development i.e. education, access to markets and infrastructure development to cater the rural-urban migration.
4. Policy should provide incentives for agro-based industry to maximize output productivity e.g. textile industry, leather industry.
5. Formulation and strict enforcement of land zoning laws to avoid conversion of prime agricultural land to non-farm uses.
6. Policy must aim at reducing role of middleman from agriculture marketing system by introducing mechanism to facilitate farmers.
7. Promote ecological farming practices. One of the main reasons why ecological farming has not proved economically more attractive is that so far there is no difference in market prices of products from the two systems. Consumers are still not much concerned about the health effects of agro-chemicals-based products. Ecological agriculture will probably be economically attractive in the future, if increasingly health-concerned urban people will be ready to pay higher prices for produce free of chemical fertilizers and toxic insecticides.

8. Policy should provide a fair taxation regime which will provide financing for strengthening future agriculture research and capacity building of the relevant organization.

Beside these recommendations, to overcome the priority issues, management practices for each sector have been proposed as below;

Reducing Pollution

The management of nutrients and the soil that support crop and livestock production, the management of pesticides, herbicides and pharmaceuticals that control pests and disease, and the management of waste are particularly relevant to tackling the issue of pollution. Following actions will support the nutrient management on farm;

i) Nutrient Management

Livestock feed lead to a net flow of nutrients from arable lands to livestock systems. Transport of livestock wastes in the opposite direction is uncommon. Slurry or Farm Yard Manure (FYM) when utilized correctly increases productivity, enhancesthe soil resource and reduces the requirement for artificial fertilizers. Efficientuse of fertilizers and manures for crop production is critical to profitability and should be encouraged.

ii) Soil Management

Erosion requires continuing attention and remedial management: if damage is allowed to develop, productivity is reduced and the potential for diffuse pollution events increase. Although soil erosion is a natural process, it can be exacerbated by inappropriate land use andmanagement. This can be significantly reduced by the maintenanceof plant cover throughout the year. Where this is not feasible, e.g. arable crop production,reducing the time interval where bare soil is present will help.

Addressing the Climate Change

Contribution of agriculture to greenhouse gas emissions, andthe impacts of climate change on agricultural systems should be examined further; and the potential for agriculture to reduce the magnitude of climate change, and its local effects, should be researched. Agricultural policy, support payments, agri-environmentschemes and codes of best practice should be amended in the light of this research to require a co-operative response.

Integrating Policies

A strategy unit should be created to develop policies that integrateproductive land use, environmental management and rural development as well as promoting high standards of stakeholder engagement and the sharing of skills and experience. This will place the provincial departments in a strengthened position to support its Minister with relevant, agreed and practical policy priorities.

Interagency Cooperation

Agencies with responsibility for protecting andconserving the environment should extend their current partnership arrangements by the creation of joint project teams, shared funding, and the development of facilitation skills. The co-location of staff wouldalso promote better communication and present a more integrated approach to the public.

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