

NATIONAL CONSERVATION STRATEGY

On March 1, 1992, the Cabinet of Pakistan approved the National Conservation Strategy. This 406-pages document was prepared by a team of experts over a three-year period under the supervision of the Deputy Chairman of the Planning Commission. It involved more than 3,000 people through workshop, comments on drafts and other consultations. In 1988, a small secretariat was created for formal documentation of the NCS. The following steps were taken to determine the feasibility of the strategy:

- formation of a steering committee, comprising of the highest level of decision-makers in the country concerned with the environment, in order to obtain their consensus on various aspects of the conservation strategy,
- preparation of sectoral papers by experts in the country, clearly bringing out specific environmental problems and issues,
- circulation of the draft NCS report for public feedback, and
- wide dissemination of the approved policy, especially to local counterparts in the provinces.

It describes the stark reality of the country's deteriorating resource base and its implications for what is still largely a natural resource-based economy. It sets forth the beginnings of a plan to integrate environmental concerns into virtually every aspect of Pakistani economic life.

The Strategy has three overriding objectives: conservation of natural resources, sustainable development, and improved efficiency in the use and management of resources. Reaching these goals depends in turn on three operating principles:

- Achieving greater public partnership in development and management;
- Merging environment and economics in decision making;
- Focusing on durable improvements in the quality of life of Pakistanis.

Part I of the report surveys the state of Pakistan's environment in the broadest sense by examining the quality of its land, water and air, its energy use, the health of its people, and the institutions and policies that deal with these concerns.

The report points out that less than 20% of the country's 88 million hectares have the potential for intensive agricultural use an amount nearly matched by the current cultivated acreage. In addition, at 4% Pakistan has one of the smallest percentages of land surface covered by forest in the world.

Ample scope exists for increased agricultural production through multiple cropping and higher yields per hectare. However, to achieve this level of intensity, serious problems of water and wind erosion, salinity and sodicity, waterlogging, flooding and loss of organic matter from the soil must be tackled. Deforestation must be arrested and reversed.

Pakistan relies on irrigation for more than 90% of its agricultural production. Although the amount of water available per acre has increased by more than a third over the last 30 years, the efficiency with which it has been used has not. Even by the standards of the rest of Asia, Pakistan's irrigation efficiency record is poor. Only about 30% of the water diverted from the river system actually reaches the crops. The rest is lost in poorly maintained, largely unlined, often weed-infested, canals and watercourses and through poor farming practices.

The arid and semi-arid rangelands which cover much of the country are in bad shape with chronic overgrazing and poor maintenance practices responsible for productivity losses

of up to 40%. In a dry country like Pakistan, this is often a prelude to desertification.

Pakistan's considerable marine resources are also under threat. Untreated urban sewage, mangrove cutting, siltation and unplanned urban development affect particularly the coastal areas around Karachi. Fresh water resources are also becoming increasingly polluted.

As the NCS points out, Pakistan is energy poor and energy profligate. Rural dwellers have little access to commercial energy sources and are often forced to rely upon the nation's dwindling forest resources and other biomass for fuel for cooking and heating. Yet the "modern" sector uses what commercial energy is available very inefficiently. Pakistan's energy use per unit of the gross national product is as high as that of the United States, one of the world's most wasteful energy consumers.

Pakistan also suffers from high levels of pollution. Only half the urban excreta is disposed of in sewers, and virtually none of that is treated before it flows into the rivers and the sea. While 44% of the Pakistani population has access to piped water, surveys of most urban locations suggest that none of the water is safe for human consumption. Gastrointestinal diseases account for more than a quarter of all hospital cases and approximately 60% of infant deaths are due to infectious and parasitic diseases, most of them waterborne. The Pakistan National Report to the United Nations Conference on Environment and Development estimates that 80% of urban deaths are caused by unhygienic water.

Untreated sewage has contaminated many of the country's rivers and streams. The Strategy cites the example of the Ravi River downstream from Lahore where pollution has cut fish production by 5,000 tons a year.

Solid waste is also a problem. Only about half of the country's solid waste is collected by the municipal authorities. In Karachi, a city of 11 million people, only 55% of the households have garbage collection. Most of these wastes are

disposed of in poorly sited and maintained dumps. The remainder of the household waste are simply left on streets or dumped on vacant land.

But domestic wastes are not the only pollution problem. A 1985 survey of 100 hazardous chemical industries by the Pakistan council for Scientific and Industrial Research showed that only three plants treated their wastes to commonly accepted standards.

As if contemporary problems were not sufficiently serious, the report goes on to point out that Pakistan's annual population growth rate of 3% is one of the highest in the world. And even the most optimistic forecasts do not see that figure dipping below 2% for at least 20 years. Pakistan is already the world's tenth most populous country with at least 122 million people. It is also the fourth most densely populated country in the world. If the current growth continues, Pakistan will double its population in 23 years.

Therefore, without major changes in Pakistan's current development pattern, efforts to provide these quarter billion people with a decent standard of living will result in the environmental and poverty problems which would dwarf the current crisis.

But the NCS is not a gloom and doom document. The bulk of the report deals with solutions to these problems. Part II contains detailed recommendations for various sectors of the economy. It makes a strong statement about the urgency of merging economic and the environment in decision making and the use of economic instruments rather than regulation to control pollution. It also identifies a series of crosscutting inter-sectoral programmes for population, education, communications, research and the role of women.

Part-III contains 68 different programmes which would boost the government's spending on projects broadly related to natural resource management and the efficiency with which resources are used from about 4% of national investment to 8% by the year 2000. Perhaps most important, it lays out a

wise ranging set of recommendations to reform the way in which economic decisions are made.

The NCS recommended the following 14 core programme areas for priority implementation: -

1. Maintaining Soils in Cropland
2. Increasing Irrigation Efficiency
3. Protecting Watersheds
4. Supporting Forestry and Plantation
5. Restoring Rangelands and Improving Livestock
6. Protecting water bodies and Sustaining Fisheries
7. Conserving Biodiversity
8. Increasing Energy Efficiency
9. Developing and Deploying Renewables
10. Preventing/Abating Pollution
11. Managing Urban Wastes
12. Supporting Institutions for Common Resources
13. Integrating Population and Environment Programs
14. Preserving the Culture Heritage

Sixty Eight Specific Programs

Sixty Eight specific programs have been identified in the above areas, each with a long-term goal and with expected output and physical investments required within the next decade. All these programs have respective communication, extension, research and training components. These programs are:

(1) *Maintaining Soils in Croplands*

1. Biological Pumpage by Phreatophytes; farmer field surface drainage
2. Gypsum Application on Sodic Soils
3. Increased Organic Manure Application
4. Saline Agriculture
5. Green Manuring by Leguminous Crops

6. Direct/Indirect Return of Crop Residues to Soil
7. Soil Conservation Works in Rainfed Croplands

(2) ***Increasing Irrigation Efficiency***

8. Irrigation System Rehabilitation
9. Command Water Management; Lining of Distributaries
10. On-farm Water Management
11. Improved Water Harvesting in Torrent-Irrigated Areas.

(3) ***Protecting Watersheds***

12. Integrated Watershed Management

(4) ***Supporting Forests and Plantations***

13. Intensive Management of Critical Forest Areas
14. Afforestation on Marginal Private Land by Land Owners
15. Community Forestry
16. Linear Plantations
17. Urban Plantations
18. Courtyard/Social Forestry

(5) ***Restoring Rangelands and Improving Livestock Quality***

19. Community-based Range Management
20. Selective Sand Dune Stabilization
21. Disseminating HYV Fodder; Improving Livestock Quality

(6) ***Protecting Water Bodies and Sustaining Fisheries***

22. Sustaining Mangroves under Reduced Fresh Water Inflows
23. Improved handling of Marine Catch

- 24. Fishers Ancillary Employment Program
- 25. Utilization of Wastelands of Fish Farming
- 26. Integrating Fish Farming into Agro-pastoral Systems
- 27. Pen Fish Culture in Small Reservoirs of Fruit/Vegetable Wastes

(7) ***Conserving Biodiversity***

- 28. Promoting Integrated Pest Management
- 29. Development and Implementation of Management Plans for Priority National Parks and Protected Areas
- 30. Development of New National Parks
- 31. Development of New Wetland Reserves
- 32. Medical Botany and Germplasm Preservation Programs
- 33. Community management of Game Reserves
- 34. Program for Endangered Species
- 35. Captive Breeding in Private Sector

(8) ***Increasing Energy Efficiency***

- 36. Energy Conservation by Reducing Transmission and Distribution Losses
- 37. Energy Conservation in Large Industries
- 38. Energy Conservation in Building, retrofits and Appliances
- 39. Energy-efficient Cooking Program
- 40. Co-generation in Industrial Units

(9) ***Developing and Deploying Renewables***

- 41. Development and Deployment of Biogas Units
- 42. Development and Deployment of Open-core Gasifiers and Solid-State Fermentation Units
- 43. Development and Deployment of Solar Water Heaters and Solar Cookers
- 44. Development and Deployment of windmill Pumps
- 45. Energy from Woodfuel Plantations

46. Development of Micro-and Mini-hydel Plants
47. Applied Research and Development of Wind Energy Farms

(10) ***Preventing/Abating Pollution***

48. Shifting Industry Composition towards Environmentally Benign Processes and Products
49. Integrating Clean, Low-waste Technology in New Large Manufacturing
50. Retrofitting of Pollution Abatement Equipment in Existing formal Industry
51. Collection and Treatment of Wastes of Urban Small Industries
52. Refineries Upgrading Program
53. Vehicle Tune-up and Related Program
54. Setting up compressed Natural Gas Stations

(11) ***Managing Urban Wastes***

55. Garbage Collection and Disposal Programs
56. Energy-farm-waste Plants
57. Wastewater Treatment of Livestock Farms
58. Construction of Oxidation Ditches/Other Biological Treatments

(12) ***Supporting Institutions for Common Resources***

59. Rural and urban Community Organization

(13) ***Integrating Population and Environment Programs***

60. Acceleration of Conventional Population Welfare Programs through Health system and NGOs
61. Involvement of Resource Sector Extension Agents in Disseminating Family Planning Goals

62. Intensive Population Programs in Fragile Areas with High Fertility Rates

(14) ***Preserving the Cultural Heritage***

63. Area Conservation of Large Urban Centers of Historical and Cultural Significance
Area Conservation of Small Historic Towns
64. Area Conservation of Small Historic Towns
65. Conservation of Historical Monuments and Buildings
66. Conservation of Archaeological Sites, Monuments and Forts
67. Restoration of Buildings of Architectural Merit
68. Identification and Documentation of Traditional Resource-conserving Cultural practices

SUMMARY OF AGRICULTURE POLICIES AND MEASURES

FOR PROTECTING, REGENERATING, CONSERVING AND
MANAGING SOIL AND WATER RESOURCES IN RAINFED
AREAS

Policies

- Halt over-use of prime soil/and resources.
- Check/reserve soil/land degradation processes.
- Manage water run-off/shortage to prevent soil erosion.
- Restore and improve fertility/structure of degraded soils.
- Optimize land use.

Measures

- Develop soil and water conservation plans for each sub-catchment area.
- Protect, under permanent vegetation cover, high-risk erosion areas.
- Use integrated engineering, cultural, and biological soil/water conservation solutions.
- Adop ecologically compatible cropping systems.
- Encourage adoption of effective soil and water conservation practices.

FOR PROTECTING, REGENERATING, CONSERVING,
AND MANAGING SOIL/WATER RESOURCES
IN IRRIG-ATED AREAS

Policies

- Halt/control salinity/sodality, waterlogging, and soil structure deterioration problems.
- Prevent/control soil degradation processes.

Measures

- Identify and demarcate areas requiring high priority regeneration.
- Subsidize gypsum supplies to farmers for reclaiming salt-affected soils.
- Correct sodality and structure deterioration in about half the area irrigated by sodic tube-well water.
- Encourage construction of Open farm drainage systems and install shallow tube-wells/tile drains as appropriate.
- Develop fish ponds in appropriate low-lying areas.
- Strengthen existing arid zone research institutes.
- Promote land leveling to increase water-use efficiencies.

FOR UTILIZING CULTIVABLE WASTE

Policies

- Use cultivable waste areas, based on land capability data and availability of water.

Measures

- Develop land use plans for cultivable waste areas.
- Use land in sweet water areas to grow ecologically compatible crops.
- Grow salt-tolerant grasses, shrubs and trees in saline groundwater areas wherever feasible.

FOR INTENSIFICATION

Policies

- Concentrate intensification efforts on the best lands (Classes I and II)
- Give priority to developing farming systems that retain/absorb farm labour.
- Encourage the recycling of organic matter.
- Minimize of synthetic pesticides and insecticides.

Measures

- Promote the most efficient and sustainable husbandry methods.
- Demonstrate to and advise farmers on improving use of poorer land areas.
- Initiate and sustain supportive Federal and Provincial programmes in education, economic development, value-added local produce projects, the establishment of markets, marketing facilities, roads, and transport, and training.

- Adopt integrated crop/livestock production system.
- Encourage incorporation of crop residues into soils.
- Ensure provision of appropriate tillage implements for incorporation.
- Adopt use of integrated pest management/control methods.
- Enforce prohibition of banned pesticides / insecticides.

FOR ACHIEVING AND SUSTAINING THE IMPROVEMENT OF MOUNTAIN AGRICULTURE

Policies

- Encourage land use adjustments.
- Prevent/control soil and water erosion.
- Develop and promote community-based management systems.
- Initiate and sustain supportive Federal and provincial programmes in education, economic development, tourism services, value-added local produce projects, the establishment marketing facilities, roads, and transport and training associated with transmigration.

Measures

- Prepare soil and social surveys.
- Demarcate areas for priority action: high-risk erosion areas, and potentially high-value cropping areas.

- Develop community purchasing and marketing groups.
- Diversify local economic activities to include sustained development of appropriate-scale agriculture and timber-based industries, assisted by the provision of small-scale machinery/equipment.
- Adopt integrated cropping / livestock production systems.

Source; page 169 & 170 of NCS Document

SUMMARY OF FORESTRY MANAGEMENT POLICIES AND MEASURES

Policies

- Give top priority to recognizing the vital ecological services provided by watershed, reverie, and mangrove forests, and to their maintenance.
- Use forest resources sustainable, in most cases close to maximum sustainable yields, thus promoting vigorous growth of younger stock, in order to meet conservation criteria as well as national and local demands.
- Preserve and manage on a representative basis some old forests to maintain the bank of biodiversity.
- Concentrate statement management in forest areas vital to public interest, in order to be effective, undertake an interdepartmental programme to provide alternative sustainable livelihoods to affected locals.
- Accelerate the current efforts to promote afforestation on critical watersheds under private ownership.
- Upgrade the programme for promoting plantations (on marginal agricultural lands, along field boundaries, etc.) to meet the rising domestic demand for timber and related products while enhancing natural resource values.

Measures

- Increase awareness and thereby muster political support for sustainable development of forestry resources.
- Revise forestry legislation and forest policy directives to meet essential ecological requirements, given socio-economic realities and potentials.
- Use satellite imagery in conjunction with ground trotting both to assess and monitor earth degradation process in critical ecosystems and to identify priority areas for new planting.
- Conduct multi-disciplinary problem-oriented research for each agro-sylvo-pastoral system in order to generate technology packages for end-users.
- Prepare strategic action plans in the light of physical and socio-economic findings and available resources.
- Strengthen the forest departments to achieve public objectives in the 0.5 million hectares of state hill forests classed as closed-cover conifers.
- Improve administrative arrangements of delivery of multi-sectoral services and advice to enable sustainable livelihoods for populations residing in and around hill forests.
- Accelerate watershed management programmes in all other hill forest areas by shifting towards an integrated and facilitative role for departments.
- Promote the private sector to take the lead role in irrigated plantations and farm forestry.
- Introduce economic guarantees in support of private farm forestry and related initiatives in the case of cultivable wasteland.

- Demonstrate the benefits of arid un-irrigated area plantations.
- Preserve genetic resources and biodiversity by selective creation of strict ecological reserves, declared as such.
- Restructure forestry extension by strengthening social forestry extension circles and upgrading forestry packages of agriculture extension agents as well as creating joint extension cadres according to the requirements of disseminating the technology packages identifies for each agro-ecological zone/sub-zone.
- Create forestry products marketing boards in provinces, with mandates both to provide accurate market forecasts to planters and to promote steady demands for these long gestation products, which entail timely investments by the wood pulp and paper industries and other major market outlets.
- Promote the role of women in farm and watershed forestry by special emphasis on removal of social inhibitions, information exchange, and empowerment entailing decision making and user rights.

Source; page 178 of NCS Document

SUMMARY OF RANGELAND REHABILITATION POLICIES AND MEASURES

Policies

- Develop systems for effective periodic closure of rangelands, to rehabilitate them and ensure sustainable livelihoods to range dwellers.
- Make investment in the restoration of community-based management systems for communal rangelands the center piece of government support programmes.

- Facilitate on a selected basis private investment in rangeland development for commercially oriented livestock export.

Measures

- Enforce existing land reform laws where absentee holdings of large tracts of rangeland are the impediment to proper management.
- Consider the formalization of *de facto* local grazing on government-owned rangelands, not under any management scheme, by grant of range licenses to whole communities.
- In tribal areas, develop and undertake community-based revenue settlement for rangelands, involving the negotiation, recognition, and formalization of user rights and concessions, and issue rangeland management licenses to the community as a whole.
- Encourage the formation of Livestock Associations under the umbrella of existing law (e.g., Punjab Livestock Associations Ordinance, 1979).
- Upgrade departmental and multi-sectoral extension services, but keep programmes cost-effective by focusing on educational and motivational inputs and use of locally available materials.
- Provide technical and related advice on community-based management systems.
- Make public-sector investments in the form of critical interventions, such as development of watering points, selective range re-seeding, and emergency provision of palletized fodder, and link them to progress in community organization for self-help.
- Help herders reduce stock levels significantly during drought periods to match the rangeland's lowered carrying

capacity, especially by expanding the proposed fringe feedlots scheme in private sector.

- Provide compensation for income loss during drought de-stocking or closure in the form of alternate interim activity for the drought/closure duration, but linked to the main programme and of lasting benefit (*e.g.*, construction of veterinary hospital with the herders providing manual labour).
- Time any financial support to herding system (*e.g.*, loans for improvement of breeding stock) with range re-opening.
- Undertake above programmes on small-scale pilot and demonstration basis for perhaps five-year monitor and evaluate results, and follow up with extensive projects.

Source; page 183 of NCS Document.

SUMMARY OF LIVESTOCK MANAGEMENT POLICIES AND MEASURES

Policies

- Improve both the productivity per animal and the quality of produce.
- Enhance both the quantity and nutritional quality of all animal feeds and encourage the adoption of technical innovations so that the shortfalls in animal feed supplies are overcome.
- Improve farming practices by introducing high-yield variety of fodders and good-quality roughages so that the quantity and quality of fodder production are increased.
- Preserve and raise the genetic quality of indigenous stock in light of their higher disease- and heart-resistance qualities.

- Require high technology breeding agencies to be more careful about the proportions in which exotic and indigenous breeding stocks are crossed, to conserve endangered domestic species of both small and large ruminants.
- Recycle agricultural products associated with livestock production, and use the livestock sector as an outlet for the recycling of appropriate urban wastes.
- Reward the production of quality stock by introducing and objective grading system to which the livestock pricing systems are directly linked.

Measures

- Promote stall feeding in mountain and irrigated areas and controlled range grazing in arid/semi-arid rangelands.
- Launch a programme promoting high-yield variety fodders, with potential to increase yields three-to fourfold, releasing some of the 15% of the land under fodder for green manuring/cereal rotation.
- Make better use of agricultural by-products, increasing the recycling of nutrients.
- Remove price controls and economic disincentives in the livestock sector while retaining existing economic incentives particularly in the poultry industry.
- Restore previous economic incentives (*i.e.*, income tax exemption for poultry industry) and set new sunset dates matching removal of disincentives.
- Convert 30% of the non-descript local cattle population (around 75% of total) to high-yielding cross-breeds by the end of this decade.

- Improve facilities for chilling and transporting milk from rural to urban areas and for converting milk into powdered form.
- Implement coordinated programmes for rural backyard poultry production, with a focus on removing social, marketing, and credit constraints.
- Strengthen and expand the coverage of animal production extension services.
- Improve veterinary care services to reduce the high animal losses caused by viral, bacteria, and parasitic diseases.
- Provide more livestock management training facilities, especially for women.

Source; page 186 of NCS Document

SUMMARY OF WATER MANAGEMENT POLICIES AND MEASURES

Policies

- Give priority to increasing irrigation efficiencies.
- Move toward a demand-based water supply, and entailed volumetric measurement system, by the middle of the twenty-first century, balancing engineering solutions at the Indus Basin level with social cooperative approaches at watercourse and distributory scales, undertake coordinated physical, economic, and social research in the 1990s.
- Increase water charges for all farmers, at least to meet full operating and maintenance costs by 1996, thereafter move towards phased capital and environmental cost recovery.
- Support fully the development of Water Users' Associations, and subsequently Federations of WUAs, as the ultimate managers of watercourses, and subsequently distributaries, encourage NGO catalysts for the promotion of self-sustaining local communities with WUAs as components.
- Promote biological approach as well as engineering solutions to salinity/sodality and waterlogging problems, accelerate research in biological solutions.
- Invest any grant element of Government fund for rehabilitation of watercourse systems where they are most needed.
- Give increased attention to protecting watersheds.

Measures

- Rationalize water charges to reflect crop water demands fully.

- Take incremental but specific measures towards volumetric consumption as the ultimate basis for water charges; move to total farmland charges in areas where equity in water supply can be assured, to charges weighted by location along distributaries in new canal commands, and to volumetric, system in areas with improved watercourses and pucca nakkas and so on.
- Make the irrigation system self-financing, but maintain or institute the separation of assessment and collection functions.
- Undertake experiments and community management of a few distributaries on a pilot basis.
- Demonstrate and provide incentives for technical improvements leading to water conservation on farms.
- Accelerate research and extension of biological solutions to waterlogging and salinity management by farmers.
- Undertake a comprehensive review of the Water Section Investment Plan Study, to fully incorporate environmental weightage in the Indus Basin Model (Revised) as well as its Plan Generator.
- Address problems of water-table drawdown by holistic approaches, encompassing both demand management and methods to increase water recharge.
- Adopt, improve, and expand the Mangla approach to integrated watershed management, specifically adding components for community participation.

Source: page 197 of NCS Document.

SUMMARY OF COASTAL AND MARINE RESOURCES POLICIES AND MEASURES

Policies

- Develop policies on the provision of alternative sources of employment for coastal communities.
- Co-ordinate all environmental studies with socio-economic studies of current and potentially compatible land use patterns.

Measures

- Fill the major gaps in information on coastal resource use and sustainability, on the environmental impacts of different forms of resource use.
- Formulate land use plans for coastal zones using all the various agencies affected plus a specially selected group of scientists, lawyers, business experts, economists, and foresters, to eliminate the current conflict of interests.
- Conduct research and environmental impact assessments of the traditional practices of resource use, which were always sustainable.

Source; page 199 of NCS Document

SUMMARY OF FISHERIES POLICIES AND MEASURES

Policies

- Use sea fisheries fully, bringing annual harvesting up to the limit of sustainable yields.
- Protect and restore shrimp fishing habitats, with harvesting restricted to the level of annual sustainable yields.

Measures

- Use the full potential of inland fisheries to develop aquaculture.
- Harvest fisheries on a sustainable yield basis.
- Protect fisheries against both encroachment and pollution.

Source; page 200 NCS Document.

SUMMARY OF WILDLIFE AND HABITAT POLICIES AND MEASURES

Policies

- Draw up a national Wildlife Utilization and Conservation Policy that will achieve the desired protection and conservation objectives as well as the broadly compatible with agricultural and other related resource use policies.
- Increase the numbers of national parks and game reserves so that comprehensive representation of all national ecosystems is achieved.
- Control harvesting and cropping carefully to ensure that populations are sustained in perpetuity.

Measures

- Introduce incentives (such as subsidies for captive breeding of wild animals or artificial propagation of medicinal and endangered plants) to safeguard conservation areas and divert pressures from threatened wildlife habitats and species.
- Provide incentives to encourage the higher productivity of food and other goods in areas immediately outside existing or proposed national parks and protected areas where human settlements are located.

- Promote community-based management systems so that local people participate in the protection and conservation of habitats and related wildlife species.
- Enforce existing legislation strictly in support of eco-systems protection and wildlife conservation, and support it with appropriate, higher penalties.
- Introduce new legislation to protect habitats in the wider countryside, protect particular species, and ensure that CITES is implemented.
- Prepare management plans for all the main eco-systems and nature conservation areas, in particular national parks and game reserves, and prepare National Conservation Reviews.
- Introduce a degree of institutional rationalization to avoid conflicts between timber and wildlife objectives, and between the professionals charged with achieving them forestry and wildlife staff.

Source; page 205 NCS Document.

SUMMARY OF MINING SECTOR POLICIES AND MEASURES

Policies

- Minimize wastage, maximize recovery.
- Minimize harmful impacts.
- Build capital/human skill reserve against resource exhaustion.

Measures

- Disseminate Technical and geological information.
- Develop realistic standards for mining efficiency and impact.

- Support preparation of annual production sequence plans to minimize wastage.
- Enforce restoration in large open-cast mining.

Source; page 206 NCS Document.

SUMMARY OF ENERGY POLICIES AND MEASURES

Policies

- Expand the use of coal to meet short-term, electricity demand requirements, based on the least polluting technology and current emission standards.
- Take early account and full care of the impact of coal and hydel generation.
- Develop Pakistan's medium to long-term large hydro potential to meet electricity needs.
- Develop alternative source to meet additional energy requirements.
- Instill energy conservation across all sectors, in investment choices as well as current operations.
- Use energy more efficiency.

Measures

- Subject site and process selection for coal and hydro to environmental objectives, and assess and mitigate the residual adverse impacts with the same rigour as engineering design.
- Assign clear roles for the public and private sectors in supplying energy, but without predetermined segmentation of options by size, type or location.

- Arrange carefully planned, countrywide demonstrations of the convenience, adequacy, and increased reliability of locally generated energy to meet village needs.
- Shift to end use approach in planning and developing energy, specifically grinding energy and marketing segments by their requirements for various qualities.
- Rely more on private sector and community development of local energy sources, with technical assistance from WAPDA.
- Support the deployment and improvement of fluidized-bed technology for electricity generation from low-grade coal.
- Renew efforts to promote biogas plants with built-in local maintenance provisions and community support.
- Disseminate fuel-efficient cookers to reduce wood consumption in critical districts.
- Develop woodfuel plantations as part of reforestation effort through community-based management approach, for local generating stations.
- Introduce and disseminate energy-saving devices such as fluorescent bulbs, as and when they become cost-effective.
- Encourage increased use of direct solar energy for water heating.
- Promote co-generation by guarantee to buy at utility's full marginal cost.

Source; page 215 NCS Document

SUMMARY OF INDUSTRY POLICIES AND MEASURES

Policy

- Develop and enforce effective pollution controls.

Measures

- Set in place on industry-wide system for collection of national and regional statistics on location, type, and amount of effluents and hazardous wastes, plus a survey of existing waste treatment equipment and degree of use.
- Establish Government regulations and standards in consultation with industry.
- Implement a phased programme of pollution controls by EUAD and by provincial EPAs.
- Implement in-plant and end-of-pipe environmental safeguards within industry, along with the preparation of waste management plans for the reduction, collection, reuse, or treatment and disposal of industrial wastes.
- Incorporate a programme to establish and disseminate environmentally safe product standards by the proposed Quality Control Authority as part of its product standards setting function.
- Disseminate improved industrial engineering design practices for internal process and environmental control stands (e.g., promoting efficient use of coolant water, process heat).
- Reorient balancing, modernization and replacement incentives for old industry to encourage modernization that reduces pollution (as in Indonesia's industrial restructuring programme).

Policy

- Promote clean industrial processes and recycling.

Measure s

- Disseminate information on the economics of recovery with case studies of success (e.g., clinker recovery in FECTO cement).

- Encourage waste trading networks.
- Develop institutions for acquisition and transfer of environmentally benign technologies.
- Insist that branches of transitional corporations in Pakistan meet do better than the environmental standards in their home countries.
- Provide special incentives, like tax holidays, for recycling industries.

Policy

- Establish incentives for environmentally beneficial or begin industries.

Measures

- Apply the current incentives of the national industrial policy to environmentally beneficial industries.
- Grant specific fiscal and trade incentives for defined categories of environmentally sustainable industry.
- Develop a package of financial incentives to offset the cost of environmental control equipment.

Policy

- Develop a policy to site industry in areas of lower environmental sensitivity.

Measures

- Establish regional and local land use plans and controls.
- Continue controls on the location of industry in urban areas.

- Promote rural industrialization.
- Guide industry away from prime agricultural land and areas of sweet groundwater.
- Control residential development close to hazardous industry.

Policy

- Build awareness within industry.

Measures

- Give out annual awards for environmentally clean industry.
- Disseminate the sustainable development concept by lectures, video shows, etc.
- Promote pollution control systems as potential opportunities for further industry, cost savings, and so on.

Source; Page 221 NCS Document

SUMMARY OF HUMAN SETTLEMENTS POLICIES AND MEASURES

Policies

- Adopt a National Human Settlements Policy.
- Focus on selected secondary cities with significant benefit: cost advantages (high productivity, low agriculture opportunity costs and low infrastructure installation sorts, and complementary rural development policies).
- Establish a system to eradicate macro-economic and sectoral policies for implicit centralization bias and to incorporate corrective measures within them Encourage decentralization at the time when the advantages of concentration are diminishing.

Policy

- Strengthen local authorities.

Measures

- Make development authorities and water and sanitation boards the autonomous professional agents of local governments.
- Encourage local authorities to develop the range to taxes, fees, and user charge available to them by, example, linking performance with their share in taxes pooled with senior governments.
- Promote revenue operations by the local authorities in areas in which they have particular advantage, such as methane gas recovery from sanitary landfill sites.

Policy

- Undertake appropriate city planning.

Source; page 226 NCS Document

SUMMARY OF HUMAN SETTLEMENTS POLICIES AND MEASURES

Measures

- Plan and guide a city's physical expansion to anticipate and encompass needed land for new housing, agricultural land, parks, and children's play areas.
- Impose maximum standards beyond which plot and building sizes are not allowed, owing to the social costs of materials, infrastructure, and services consumed or blocked up.

Policy

- Support self-reliance and citizen involvement.

Measures

- Facilitate loans and credit to small entrepreneurs, building co-operatives, and neighborhood associations.
- Support private voluntary organizations to provide cost-effective channels of assistance directly to those who can use it.

Policy

- Facilitate housing and services for the poor.

Measures

- Provide legal tenure to those living in katchi abadies, with secure titles and basic services.
- Ensure that land and material resource needed to build or improve housing are available.
- Extend trunk infrastructure to existing and new housing areas.
- Encourage planning, building, and health professionals to set up voluntary technical assistance groups in low-income neighborhoods.
- Increase the share of House Building Finance Corporation loans directed to lower-income and community groups, with collateral criteria amended and outreach mandated to suit the illiterate groups.
- Undertake more research and dissemination of low-cost construction technologies.

Policy

- Tap more resources.

Measures

- Tax vacant urban land and provide other incentives to build on vacant plots.
- Support land-pooling schemes and their development through public and private sector co-operation.
- Recycle solid waste resources.

Policy

- Promote energy-efficient and environmentally benign urban transport systems.

Measures

- Develop and upgrade mass transit systems wherever economically feasible.
- Upgrade public transit, mainly by providing timely and comfortable sub operations.
- Develop exclusive and safe bikeways and promote the bicycle as a healthy and environmentally benign mode of transport.
- Encourage a demand for the small, highly fuel-efficient cars that are on the drawing boards of manufacturers through duty and other incentives.

Source; page 227 NCS Document.

SUMMARY OF POLLUTION CONTROL POLICIES MEASURES

EFFLUENT CONTROL

Policies

- Adopt domestic wastewater treatment technologies that provide for recovery and reuse of water, nutrients, and organic matter in ways that are safe and profitable to the operator.
- Focus the regulatory approach on industrial discharges, as these contain some of the most toxic effluents.
- Support the recovery and use of heavy metals from industrial effluents.
- Subject the import of energy and capital-intensive western technologies to stringent feasibility studies, and prefer biological methods wherever practicable.
- Give priority to areas where there is risk of groundwater contamination.

Measures

- Develop systems for safe sewage irrigation.
- Use sludge as fertilizer and soil amendment disposal on land is the best alternative as long as heavy metals are monitored, while dumping in pits, where leaching of heavy metals to groundwater is not a problem, is a possibility, failing any profit-making opportunities.
- Encourage source reduction, through recovery by industrial units of heavy metals before discharge.
- Provide alternative disposal methods, backed up by regulations preventing the discharge of industrial effluents into municipal sewers.

- Develop biological alternatives to recover and reuse heavy metals in effluents.
- Establish legal, institutional, and pricing systems to support these measures.

EMISSIONS CONTROL

Policies

- Introduce lean-burn engines.
- Defer the requirement to install catalytic converters in cars, as they require unleaded fuel, are expensive, and reduce fuel use efficiency.
- Require all new cars sold in Pakistan to meet the most stringent standards for emissions that can be achieved without catalytic converters.
- Change import duties to favor fuel-efficient engines.
- Adjust taxes on fuels to make unleaded petrol perhaps 5% cheaper, even through it is more expensive to make.
- Keep the price of fuel (except diesel) relatively high.
- Drop or reduce the subsidies for kerosene to prevent its being mixed with diesel fuel, which results in high emission levels.

SOLID WASTES

Policies

- Promote reuse and recycling by privatization of collection.
- Encourage making assistance for effective use of scavenging systems.

Measures

- Develop effective municipal garbage purchase mechanisms at intermediate delivery points.
- Promote energy from waste and composing plants by the private sector.
- Ensure proper sanitary landfill practices.
- Establish incentive and control systems to support these measures.

Source; page 235 NCS Document.

SUMMARY OF POPULATION POLICIES AND MEASURES

Policies

- Address population planning within a sustainable development perspective, encompassing natural and capital resource balances.
- Reduce the fertility rate as rapidly as possible by supporting family planning.
- Upgrade human resources; especially of women, through increased allocations for education; health, and the environment.
- Encourage mobility out of fragile ecosystems, facilitate rural retention in robust irrigated districts, and maintain a sustainable rate of urbanization.

Measures

- Promote rapid fertility reduction by obtaining clear political proclamations in favor of family planning.

- Support the delivery of family planning services within the health system.
- Facilitate out migration from fragile ecological zones, especially mountain areas, with a priority focus on farmer and graziers engaged in unsustainable mountain agriculture / grazing.
- Accelerate the programmes to promote industries in market towns and provide facilities in the village in the irrigated tracts by encouraging local self-help.

Source; page 247 NCS Document

SUMMARY OF EDUCATION POLICIES AND MEASURES

Policies

- Focus on sustainable development in the entire system of formal education and at all levels.
- Adopt a holistic perspective to environmental education.
- Centre sustainable development education on practical problems relating to the student's immediate environment.
- Aim at instilling an ethic of conservation.
- Let education on sustainable development grow from within the existing system rather than be added to it.
- Launch comprehensive non-formal education programmes to reach that large segment of population not now reached by education because of either poor access or literacy problems.

Measures

- Revise general science courses at the primary and middle school levels, at private as well as public schools, to take better account of areas of environment relevance.
- Add essays, stories, and articles on environmental themes in all language courses.
- Add environmental components to the compulsory courses of Pakistan studies in secondary schools and at the intermediate and Bachelor's level, and at professional education institutions, and revise all optional courses to include such topics.
- Encourage environmental co-curricula activities focused on rural issues in village schools and urban ones in the cities, and wherever possible devise curricula to best suit the students actual environment.
- Develop a functional glossary of environmental terms in Urdu and regional languages.
- Revise subjects now being offered at the intermediate and Bachelor's level with a view to restructuring syllabi to incorporate areas of environmental relevance, and offer Environmental Science as an optional subject.
- Add environmental components through new subjects and restructured curricula to specialized Bachelor's degrees in subjects such as population, forestry, and agriculture.
- Restructure and streamline courses at agricultural and engineering universities, at medical colleges, and in Master's programmes to include relevant environmental components.
- Add new environmental subjects within departments of agricultural and engineering Universities, Universities, with a view to develop separate departments for environment.
- Make environmental specializations a priority for all post graduate scholarships.

- Broaden the mandate gradually, while ensuring quality instruction, at specialized university departments in Faisalabad, Lahore, Karachi, and Peshawar.
- Support the involvement of NGOs as the lead mode of non-formal education.
- Revise existing AIOU programmes to include sustainable development concerns and establish new packages to address relevant conservation issues.
- Focus non-formal education and basic literacy programmes on immediate needs and issues of concern to people, with particular focus on population, health, hygiene, and conservation concerns.

Source; page 252 NCS Document.

SUMMARY OF COMMUNICATIN POLICIES AND MEASURES

Policies

- Gear environmental communication to specific audiences, messages, and media.
- Make sustainable development a national communication priority of the Government
- Mobilize forces within the conventional media and beyond to communicate greater environmental awareness and concern.
- Make communication on these issues a priority in institutions dealing with conservation and environment.

Measure

- Use radio as the lead medium for environmental communication at the grassroots level.

- Consider regional variable such as language, traditions, and culture in all environmental communications.
- Encourage celebrities and opinion makers to take up the cause of sustainable development.
- Encourage the media to interact with the Government and NGOs and to undertake investigative environmental stories.
- Set up information dissemination units in all Government environment and conservation institutions.
- Encourage the development of NGOs committed to environmental communication, and of information units within major environmental NGOs.
- Duplicate institutions like the JRC and PFEJ and increase their scope and reach to all media professionals.
- Research, document, and communicate the cultural and religious base of environmental conservation.

Source; pate 256 NCS Document.

SUMMARY OF RESEARCH AND TECHNOLOGY POLICIES AND MEASURES

Policies

- Make conservation an integral part of the National Science and Technology Policy and priority in national research efforts.
- Increase substantially the conservation and environment orientation of research and technology institutions in Pakistan.
- Focus research efforts on existing research strengths, the available pool of trained scientists, Pakistan's critical needs

(such as water use efficiency), multi-disciplinary approaches, and market needs of industry.

- Direct research towards the development of technologies that use the natural and human resource endowments that Pakistan has in abundance.
- Encourage industry to spend an agreed percentage of its revenues on research and technology development, particularly on energy conservation and control of waste discharges.
- Consider the quality of output, rather than quantity of institutions, the criterion for establishing, supporting, and evaluating research.

Measures

- Make scientists aware that conservation issues interact with and are a part of all their disciplines.
- Amend charters of research organizations to make conservation a priority in ongoing research.
- Establish criteria for selection of technology investment areas with due regard for national strengths and international trends, and dispense with obsolete and obsolescent technologies.
- Put in place programmes to increase the number and capability of researchers, especially of environmental scientists and engineers.
- Encourage greater interaction between research institutions and industry.
- Initiate periodical round-table meetings for research institutions, and Government departments on conservation orientation.

- Provide incentives to Pakistan scientists working or studying abroad to return to Pakistan.
- Set up systems for the widespread dissemination of information to all natural resources users, while removing outmoded protocols limiting such access.
- Disseminate research at the public level by using the mass media.
- Revise funding allotted to existing research institutes to make them viable not just administratively but in actual research outputs. The goal should be a 60:40 ratio for research: administrations funds.

Source; Page 260 NCS Document.

SUMMARY OF WOMEN IN DEVELOPMENT POLICIES AND MEASURES

Policies

- Establish a programme on women in development of mobilize women in a way that enhances their social status.
- Use a community-based participatory approach and emphasize organizing grassroots groups.
- Carry out the commitment of the Seventy Five-Year Plan to raise the primary school enrollment of girls to 70% and to make schools available within a radius of 1.5 kilometers.

Measures

- Relax the age limit for entering educational institutions, to encourage women who married early to continue their education.
- Introduce women, environment, and conservation as a focus area in Women's Studies Centers.

- Promote the inclusion of women's issues in non-formal education and in literacy campaigns.
- Use the media to portray women as active participants in agriculture, industry, community work, and health care.
- Consider introducing incentives to have fewer children, such as baby shows and prizes at mohalla and city levels.
- Provide information on child spacing and the dangers of frequent pregnancies to young women and mothers.
- Require community-based programmes to have a health extension worker.

Source; Page 264 NCS Document.

SUMMARY OF TRAINING POLICIES AND MEASURES

Polices

- Invest in specialize programmes to develop training expertise in key areas capable of incorporating sustainable development in all areas of national activity.

Measures for Educators

- Add major components of environmental awareness to the curriculum at Teacher Training Institutes and at Bachelor's and Master's of Education courses at various universities.
- Develop a regular system of refresher courses, training workshops, manual and newsletters for school and college teachers.
- Arrange workshops for high school and college science teachers to facilitate the growth of a cadre to add new environmental dimensions to existing subjects and late nurture the introduction of new optional courses.

- Enhance the teacher-training component and mandate of the CEEP to include training workshops in curriculum and textbook revision.
- Arrange specialized reorientation training workshops in key sustainable development areas and institute a programme for specialized training abroad for university teachers.

For Communicator

- Use media professional bodies and communication NGOs with a sustainable development focus to train media professionals, information disseminators, and extension agents.
- Have the Ministry of Information, the Environment and Urban Affairs Division, and communication NGOs arrange regular short training programmes in sustainable development issues for media professionals.
- Add a comprehensive sustainable development component to the instruction curriculum of the Information Services Academy.
- Encourage existing institutions of sustainable development relevance to also hold short training courses for communicators.
- Focus training of extension agents on first creating master trainers, who then are responsible for teaching sustainable development practices to community extension workers.

For Decision Makers

- Introduce special courses on sustainable development and conservation issues at existing training institutes servicing civil servants, local government, parastatal, corporate, and NGO managers.

- Keep training for decision makers and implementers multi-disciplinary, with narrowly focused sector training reserved for those with specialized sectoral responsibilities.
- Create or adapt existing institutes so they can provide multi-disciplinary training for those who teach sustainable development issues already at the Federal and Provincial levels.
- Provide a programme of advanced training abroad for officials designated for specialist policy advice and plan making functions.
- Strengthen existing training institutes for local government representatives in number as well as in focus on sustainable development issues, particularly community participation.
- Incorporate sustainable development in training in business administration, and encourage these institutes to offer special courses and seminars for the corporate sector.
- Organize periodic, concurrent training programmes for senior government decision makers and the corporate sector, and for decision makers at the Federal and local levels, to facilitate a better understanding of each other's roles in achieving sustainable development.

For Women

- Follow up on the Seventh Five-Year Plan's provision for training Women Development Workers.
- Focus training programmes for women on employment and earning provision, with priority given to community organization, public health, home economics, human ecology, adult education, agriculture, social forestry, and basic health services.

- Streamline existing institution for women or create new ones to provide skill training.

Source; page 268 NCS Document.

SUMMARY OF ENVIRONMENTAL INFORMATION SYSTEM POLICIES AND MEASURES

Policies

- Develop a range of environmental information systems to increase efficiencies of natural resource use and avoid pitfalls of population, resource depletion, and unsustainability.
- Develop institutional arrangement that support use of these system at all levels and their application in different types of measures.

Measures

- Improve collection, storage, and retrieval of existing natural resources inventories.
- Set up systems for the widespread dissemination of information to all natural resource users, while removing outmoded protocols limiting such access.
- Use inventories and satellite imagery for resource and environmental monitoring, feedback, valuation, and control.
- Encourage the NGO sector to develop a well-rounded capability to do national state of the environment reporting.
- Develop environmental data in the Federal and Provincial statistics agencies to support environmental analysis in sectoral departments.

- Move incrementally towards in incorporating valuations of natural resources and the environment into national income accounts.

Source; Page 272 NCS Document.

GENERAL PRINCIPLES FOR ENVIRONMENT AND DEVELOPMENT

To avoid big risks and address potential causes of pollution rather than cure the symptoms the precautionary and prevention principle should be used. Below, some general principles of environment and development are shown, which summarize the most important concepts behind environmental policy making in the world since the late 60s.

Respect for Man's and Environment's Tolerance Limits

The environmental targets that are to govern sustainable development of society must be based on man's and environment's own tolerance limits *vis-à-vis* pollutants and other damage to the environment.

The concept of Critical Loads

The critical load limit is the dividing-line for the highest load at which no harm is caused to the environment, even after long term exposure. The target load is the goal at any given time on the basis of political and administrative goals.

Polluter Pays Principle

The polluter should bear the cost of protecting the environment and cover other environmental costs of operations. This principle increase the chance that the pricing of end products will reflect their real cost. In other words, the environmental cost are internalized in the product cost.

Best Available Technology

The term Best Available Technology (BAT) signifies the latest stage of development (state of the art) of activities, processes and their methods of operation, which indicate the practical suitability of a particular technique for preventing, or

where that is not practicable, minimizing emissions to the environment as a whole.

Precautionary Principle

Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Substitution Principle

The substitution principle state that the least hazardous chemical available, that can achieve the required benefit effect, should be used. Importers, manufacturers, industrial users and consumers should use the principle.

Prevention Principle

The prevention principle state that the potential causes of pollution and environmental degradation should be addressed rather than attempt to control the effects or cure the symptoms. Prevention is better than cure and process integrated solutions are better than end-of-pipe solution.

Ecocycle Society Principle

In an Ecocycle Society the flows of various material within society have been reduced and closed to such an extent that the flows from society to the environment do not exceed the tolerance limits of man and the environment. Furthermore restproducts and substances from society should be inserted into Natures ecocycles, in such a way, that the built-up new natural resources.

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PRINCIPLES FOR SUSTAINABLE LIVING

1. Respect and Care for the Community of Life

An ethic based on respect and care for each other and the Earth is the foundation for sustainable living. Development ought not to be at the expense of other groups or later generations, not threaten the survival of other species.

The benefits and costs of resource use and environmental conservation should be shared fairly among different communities, among people who are poor and those who are affluent and between our generation and those who will come after us.

2. Improve the Quality of Human Life

The aim of development is to improve the quality of human life. It should enable people to realize their potential and lead lives of dignity and fulfillment. Economic growth is part of development, but it cannot be a goal in itself; it cannot go on indefinitely. Although people differ in the goals they would set for development, some are virtually universal. These include a long a healthy life, education, access to the resources needed for a decent standard of living, political freedom, guaranteed human rights and freedom from violence. Development is real only if it makes our lives better in all these respects.

3. Conserve the Earth's Vitality and Diversity

Development must be conservation-based: it must protect the structure, functions and diversity of the world's natural systems, on which our species depends. To this end we need to:

- Conserve life-support systems. These are the ecological processes that keep the planet fit for life. They shape climate, cleanse air and water, regulate water flow, recycle essential elements, create and regenerate soil and enable ecosystems to renew themselves;

- conserve biodiversity. This includes all species of plants, animals and other organisms; the range of genetic stocks within each species, and the variety of ecosystems;
- ensure that the use of renewable resources is sustainable. These resources include soil, wild and domesticated organisms, forests, rangelands, cultivated land, and the marine and freshwater ecosystems that support fisheries. A use is sustainable if it is within the resource's capacity for regeneration.

3. Minimize the Depletion of Non-Renewable Resources

The depletion of non-renewable resources like minerals, oil, gas and coal must be minimized. While these cannot be used sustainably, their “life” can be extended, for example by recycling, by using less of a resource to make a particular product, or by switching to renewable substitutes where possible. These practices are essential if the Earth is to sustain billions more people in future, and given everyone a life of decent quality.

5. Keep within the Earth's Carrying Capacity

There are finite limits to the “carrying capacity” of the Earth's ecosystems to the impacts that they and the biosphere can withstand without dangerous deterioration. The limits vary from region to region, and the impacts depend on how many people there are, and how much food, water, energy and raw material each person uses and wastes. Policies that bring human numbers and life styles into balance with the Earth's carrying capacity must be complemented by technologies that enhance that capacity by careful management.

6. Change Personal Attitudes and Practices

To adopt the ethic for living sustainable, people must re-examine their values and alter their behaviour. Society must promote values that support the ethic and discourage those that are incompatible with a sustainable way of life. Information must be disseminated through formal and informal education so that needed actions are widely understood.

7. Enable Communities to Care for their own Environments

Communities and local groups provide the easiest channels for people to express their concerns and take action to create securely-based sustainable societies. However, such communities need the authority, power and knowledge to act. People who organize themselves to work for sustainability in their own communities can be an effective force whether their community is rich, poor, urban, suburban or rural.

8. Provide a National Framework for Integrating Development and Conservation

All societies need a foundation of information and knowledge, a framework of law and institutions, and consistent economic and social policies if they are to advance in a rational way. A national programme for achieving sustainability should involve all interests and seek to identify and prevent problems before they arise. It must be adaptive, continually redirecting its course in response to experience and to new needs.