



**GOVERNMENT OF PAKISTAN
MINISTRY OF WATER RESOURCES**

NATIONAL WATER POLICY

APRIL, 2018

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LIST OF ABBREVIATIONS

AJK	Azad Jammu & Kashmir
CEA	Chief Engineering Adviser
CFFC	Chairman Federal Flood Commission
DMPs	Drought Management Plans
FATA	Federally Administrated Tribal Areas
FFC	Federal Flood Commission
GB	Gilgit Baltistan
IRSA	Indus River System Authority
IT	Information Technology
KP	Khyber Pakhtunkhwa
NDMA	National Disaster Management Authority
NEQS	National Environmental Quality Standards
NIO	National Institute of Oceanography
NWC	National Water Council
NWP	National Water Policy
O&M	Operation and Maintenance
PARC	Pakistan Agricultural Research Council
PCIW	Pakistan Commissioner for Indus Waters
PCRWR	Pakistan Council of Research in Water Resources
PCS	Policy Steering Committee
PHED	Public Health Engineering Department
PIDA	Provincial Irrigation & Drainage Authority
PWIB	Private Water Infrastructure Board
PMD	Pakistan Meteorological Department
PWA	Provincial Water Authority
PWD	Public Works Department
RWH	Rainwater Harvesting
SCARP	Salinity Control and Reclamation Programme
WAPDA	Water and Power Development Authority
WASA	Water and Sanitation Agency
WASH	Water, Sanitation and Hygiene

NATIONAL WATER POLICY OF PAKISTAN

1. PREAMBLE

The irrigation network of Pakistan is one of the largest contiguous irrigated systems in the World. The snow-clad peaks of the mountain ranges in the North continuously re-charge the system. The descending snow-melt and monsoon waters flow into the country's Indus River System and its tributaries. Passing through the plateau and the great plains across the Indus Valley, the rivers join up to form the Indus that eventually drains into the Arabian Sea in the South. Irrigated agriculture is the backbone of the country's economy, and consumes around 95 percent of the nation's water resources, the balance is used for domestic and industrial requirements.

With rapidly growing population, Pakistan is heading towards a situation of water shortage and by corollary, a threat of food insecurity. Per capita surface water availability has declined from 5,260 cubic meters per year in 1951 to around 1,000 cubic meters in 2016. This quantity is likely to further drop to about 860 cubic meters by 2025 marking our transition from a "*water stressed*" to a "*water scarce*" country (The minimum water requirement to avoid food and health implications of water scarcity is 1,000 cubic meters per capita per year). The situation calls for rapid development and management of the country's water resources on a war footing.

Water resources are inextricably linked with climate and the impending climate change scenario has serious implications for Pakistan's water resources. The changing and unpredictable precipitation patterns may have serious consequences, including flash floods in the north and increasingly prolonged droughts in the south. As the glaciers retreat, more glacial lakes will form, increasing the risk of Glacial Lake Outburst Floods (GLOF), which are already becoming increasingly common and hazardous in the Northern parts of the country. Only by devising and implementing appropriate adaptation measures will it be possible to ensure water, food and energy security for the country as well as minimize the impact of natural disasters.

The objective of the National Water Policy is to take cognizance of the emerging water crisis and provide an overall policy framework and guidelines for a comprehensive plan of action. Pakistan has a federal system of government and the provinces enjoy a considerable degree of

autonomy under the 18th Amendment to the Constitution. Thus, this policy is a national framework within which the provinces can develop their master plans for sustainable development and management of water resources. The water resource is a national responsibility but irrigation and agriculture, as well as rural and urban water supply, environment and other water related sub-sectors are provincial subjects.

The development and management of water resources in Pakistan has received considerable attention in many national and international studies and reports in the past three decades. These include:

- The Report of the National Commission on Agriculture, Chapters 6,17,18(1988).
- Report of the Inter-Provincial Committee on the Apportionment of the Indus Waters (1991).
- Water Sector Strategy by the Asian Development Bank (2002).
- WAPDA's Vision 2025 Report (2003)
- Pakistan's Water Economy Running Dry by John Brisco (2005).
- Development of Integrated River Basin Management for Indus Basin: World Wildlife Fund (2012).
- A Productive and Water Secure Pakistan: Report by Friends of Democratic Pakistan (2012).
- Pakistan Vision 2025: Pillar IV: Energy, Water and Food Security; Planning Commission, Government of Pakistan (2014)
- A Region at Risk – the Human Dimension of Climate Change in Asia and the Pacific: Report by Asian Development Bank and Potsdam Institute for Climate Impact Research: (2017).

These useful Reports and Studies stimulated considerable debate in professional circles and may have led to some useful projects and initiatives but the overriding objective of evolving an integrated Water Resources Management Strategy which can promote the coordinated development and management of water and land resources in a sustainable and equitable manner, has not yet been achieved. This is partly because any crisis that is creeping slowly does not normally attract high level political attention. But in Pakistan, concerns about future water

shortages have been moderated at the farm level, by expanding abstraction of ground water in Punjab and Sindh. Currently 1 million tube wells are pumping about 55 million acre feet of underground water for irrigation, which is 20% more than that available from the canals.

But now a water crisis is descending like a thunderbolt. While the continuing increase in population at an annual rate of over 2% combined with rapid and un-regulated urbanization has already pushed Pakistan into the category of water stressed countries, the phenomenon of climate change is causing faster melting of the high altitude glaciers, on which the Indus Basin system is dependent and is also raising sea levels. Pakistan is located in one of the three most vulnerable regions in the world in terms of climate change threats of increasing frequency and intensity of floods, prolonged droughts and the frightening possibility of the melting of the Himalayan Ice cap.

This National Water Policy can provide a major response to the emerging water crisis if:

- It receives high level political support, as a national imperative.
- It provides a set of agreed national targets for water conservation, water storage, water treatment and clean drinking water.
- It leads to a sustained national commitment to substantially increase public and private resources for the water sector.
- It creates an institutional framework that can address present deficiencies in project management and cost effective maintenance on a war footing to revive the technical capacity and efficiency of the system that achieved such remarkable progress between 1950 and 1990.

Main Concerns

Some of the specific issues concerning the water sector are:

- i. Fresh water being a finite resource is progressively becoming more scarce due to persistent increases in its competing demands;

- ii. Water scarcity can adversely affect the health and well-being of the people of Pakistan and must be resolutely addressed especially since it has serious implications for the nation's food and energy security;
- iii. The geographic location of Pakistan places the country in the heat surplus zone on Earth, putting it high on the vulnerability scale of climate change with considerable increase in frequency and intensity of extreme weather events and erratic monsoon rains (as demonstrated by the unprecedented floods of 2010)
- iv. Existing and planned trans-boundary developments on the Western Rivers could further impact water availability to the disadvantage of Pakistan;
- v. The "Indus Basin Replacement works" (dams in particular) are approaching the end of their designed life span due to siltation. requiring replacement storages;
- vi. Different regions in the country are endowed differently with water in terms of precipitation, surface flow and ground water and there is increased stress on the sharing of water resources;
- vii. Lack of equity in water allowances of various canal commands is causing water and salt imbalances at a regional level;
- viii. Salt balances in irrigated lands are already negative and with the passage of time the soil quality will deteriorate resulting in reduced yields.
- ix. Bulk of drinking water requirement is met by groundwater which is depleting and its quality is deteriorating;
- x. It is necessary to avoid growing conflicts and social unrest in the country due to water scarcity;
- xi. The mandate and roles of the federal and provincial water related agencies need to be reviewed in view of the 18th Amendment to the Constitution;



- xii. Concentrated efforts are needed to re-use treated sewage water in order to reduce sweet water demand;
- xiii. There is lack of awareness amongst the general public about the impending threat of water scarcity and the huge wastage of sweet water; excessive watering of crops is endemic with total disregard for efficiency and conservation;
- xiv. Desalinization of Sea water is a significant source of water, however, no effort has been made for desalinization in the light of technology advances and international best practices;
- xv. Irrigated agriculture is indispensable for Pakistan's agriculture and low irrigation efficiency vis-à-vis water productivity is a major factor leading to lower growth of the sector;

It has become a national imperative to ensure water security for the people of Pakistan, through a National Water Policy (NWP) laying down the outlines of an integrated water management strategy that can optimize the economic, social and environmental returns on water resources, ensure equitable allocation among its competing demands as well as its judicious use by consumers and safe disposal of post-use effluents.

2. POLICY OBJECTIVES

The National Water Policy lays down a broad policy framework and set of principles for water security on the basis of which the Provincial Governments can formulate their respective Master Plans and projects for water conservation, water development and water management.

The National Water Policy is based on the concept of Integrated Water Resources Management primarily aimed at the following policy objectives:

- 2.1 Promoting sustainable consumption and production patterns throughout the water sector from exploitation to utilization;

- 2.2 Augmentation of the available water resources of the country through judicious and equitable utilization via reservoirs, conservation and efficient use;
- 2.3 Improving availability, reliability and quality of fresh water resources to meet critical municipal, agricultural, energy, security and environmental needs;
- 2.4 Improving urban water management by increasing system efficiency and reducing non revenue water through adequate investments to address drinking water demand, sewage disposal, handling of wastewater and industrial effluents;
- 2.5 Promoting behavioral change to reduce wastage of water by raising public awareness through media campaigns and incorporating water conservation lessons in syllabi/curricula at primary, secondary and tertiary levels;
- 2.6 Hydropower development to increase the share of renewable energy;
- 2.7 Providing food security and expanding water availability to help adapt to climate change, population and other large-scale stresses;
- 2.8 Treatment and possible reuse of waste water - domestic, agricultural and industrial;
- 2.9 Upgrading water sector information systems for improved asset management and to derive evidence and data driven decision making;
- 2.10 Improving watershed management through extensive soil conservation, catchment area treatment, preservation of forests and increasing forest cover;
- 2.11 Restoring and maintaining the health of the environment and water related eco systems;
- 2.12 Flood management to mitigate floods and minimize their damages;

- 2.13 Drought management with emphasis on long term vulnerability reduction;
- 2.14 Security of benefit streams of the water related infrastructure for sustained provision of services;
- 2.15 Promoting appropriate technologies for rain water harvesting in rural as well as urban areas;
- 2.16 Regulating groundwater withdrawals for curbing over-abstraction and promoting aquifer recharge;
- 2.17 Adequate water pricing (Abiana) for irrigation and proper operation and maintenance of the irrigation system as well as other user sectors;
- 2.18 Promoting measures for long term sustainability of the Irrigation System;
- 2.19 Encouraging beneficiary participation and public private partnerships;
- 2.20 Strengthening and Capacity building of water sector institutions;
- 2.21 Profitable use of flood water towards promotion of local irrigation practices;
- 2.22 Exploitation of vast potential of water generated through hill torrents;
- 2.23 Protection of wet lands and Ramsar Sites for the prevention of wild life, flora and fauna;
- 2.24 Stoppage of further sea water intrusion into Sindh (upstream from coastline) for the sustainability of coastal environment, flora and fauna and mangrove growth including the use of skimming dug- wells in coastal areas ;
- 2.25 Establishment of Hydro-meteorological disaster risk reduction complied integrated water resources management regime;
- 2.26 Enhancing water productivity through infrastructure development and adoption of improved technologies in a sustainable manner;
- 2.27 Climate change impact assessment and adaptation for sustainable water resources development and management;

- 2.28 Promoting research on water resources related issues of national importance and building capacity/delineating roles and responsibilities of Federal research institutions and promoting coordination among them;
- 2.29 Setting major national targets for the water sector including those for water conservation, water storage, Irrigation, water treatment and drinking water. These targets can be firmed up in consultation with the Provincial Governments and reviewed periodically for inclusion in the 12th and 13th Five Year Plans and future plans;
- 2.30 Secure Katcha areas and economy thereof;
- 2.31 Preserve delta area by providing sufficient supplies regularly;
- 2.32 Rainwater management in plains where it cannot be disposed of or diverted to the river;
- 2.33 Effective implementation of the 1991 Water Apportionment Accord in letter and spirit.

3. **STRATEGIC PRIORITIES AND PLANNING PRINCIPLES**

The objectives of the National Water Policy (NWP) are grounded in a set of principles aimed at promoting greater national interest and the welfare of the people of Pakistan. In addition, several strategic initiatives have been identified that will be taken up at the Federal and Provincial levels, since they are of critical importance to the water, energy and food security of Pakistan. These include,

- 3.1 **Conservation and Efficiency:** More than 50 per cent of canal water diverted from the Indus system does not reach the farm level. While the main canals cannot and should not be lined, a crash programme for lining the water courses can reduce the seepage by at least one third. Similarly conservation measures can be adopted for ground water by regulating its extraction and use. Both conservation and efficiency must be highlighted for Demand Side Management (DSM) of water resources. The current policies have a supply side bias. It is important to make the distinction between efficiency, which means reducing waste and doing more with less and conservation, which refers to restricting use.
- 3.2 **Storage:** The most important instrument of mitigation against the impact of climate change on water resources is storage. If the pattern of rainfall becomes erratic with more than average rain in one year and a drastic reduction in the next years' rainfall, the only

way to conserve the surplus rainwater in wet years is to store it and release it in dry years, when required. For storage and new irrigation projects a national master plan must be developed which must cater for storage, floods, arid areas, irrigation, urban water and tariff rationalization. In addition there are vast possibilities of small and medium size dams, enhancing the life of existing storages and remodeling and rehabilitation of existing infrastructure in the country. Expansion of water storage will expand irrigation and also increase the proportion of hydro-power in the energy mix, reducing the need for thermal power.

- 3.3 Leveraging Technology: Adoption of new technologies is urgently needed for (i) sea water utilization and water recycling (ii) preparation of an inventory of water resources through remote sensing and GIS technologies (iii) accurate monitoring of irrigation water delivery. Home grown innovation in the water sector should be encouraged as much as possible, including investments aimed at start-up companies that promote remote sensing, demand side management and agricultural productivity.
- 3.4 Renewable Energy: Sustainable water resources development has a close nexus with renewable energy. Large, medium and small dams not only generate cheap and clean energy but also provide reliable source of water for agriculture and other human needs. With appropriate policies and subsidies, a large percentage of tube wells in Pakistan, can be converted to solar energy especially in areas where water table is not very low, to provide additional water at lower cost. Solar energy can also be used for day-time de-salinization of sea water, particularly in the coastal areas of Balochistan.
- 3.5 Integrated Water Resource Management: The management of water resources is shifting from sectoral to a more integrated approach in different parts of the world. Under IWRM, (i) the interests of all upstream and downstream stakeholders can be protected against mining and contamination. (ii) Watershed and catchment areas can be protected to prolong the life of water storage facilities. This revolutionary IWRM concept will however require strengthening institutional and management capacity at all levels.
- 3.6 Comprehensive Regulatory Framework: The Federal government must play a leading role in facilitating regulations to ensure the

efficient and sustainable utilization of ground water, industrial uses, and waste water management. Food security, water security and energy security being inextricably linked, so the regulatory framework must address all the associated issues comprehensively, including ground water contamination, waste treatment, open defecation (WASH).

3.7 Planning Principles: The process of planning, development and management of water resources at the Federal and Provincial level, including the development of this policy will be guided by the following set of principles:

3.7.1 Equity and participatory decision-making; Water sector activities shall be participatory and consultative at each level and decisions will be taken by consensus

3.7.2 Water is a strategic resource and access to affordable and safe drinking water is a fundamental human right of all citizens

3.7.3 Efficiency and conservation will be promoted at all levels

3.7.4 Environmental Sustainability must be ensured

3.7.5 Practicability and Innovation will be encouraged and ensured

3.7.6 Command area development shall be the responsibility of farmers with government support in respect of small land-holdings

Within these broad parameters of water security, the provincial governments can formulate more detailed policies and guidelines on other subjects like (i) water pricing (ii) drinking water, (iii) water quality and (iv) water treatment, keeping in view the national environment policy 2005, the national sanitation policy 2006 and the national drinking water policy 2009 and the overall agricultural priorities.

4 RELATIVE PRIORITY OF WATER USES

The priorities for the consumptive and non-consumptive uses of water shall be as follows:

4.1 Drinking and Sanitation (WASH)

4.2 Irrigation including land reclamation

- 4.3 Livestock, fisheries and wildlife
- 4.4 Hydropower
- 4.5 Industry and mining
- 4.6 Environment, river system, wetlands, aquatic life
- 4.7 Forestry including social forestry
- 4.8 Recreation and sports
- 4.9 Navigation

5 BASIN LEVEL PLANNING FOR DEVELOPMENT OF WATER RESOURCES

5.1 The principles of integrated and unified planning, development and management shall be adopted. Water demand shall be estimated for all sectors, within the Basin and outside the Basin. The process of holistic approach to planning shall aim at accommodating a fair and stable economic and social development within an integrated drainage Basin management. Environmental impact assessment studies shall be carried out concurrently with project feasibility studies for selecting project scope and layout, consistent with productivity, economic viability, social acceptability and environmental sustainability.

5.2 The Guiding Principles laid down in Section 4 above shall be invariably followed in all processes of planning and development of water resources. The rights on sharing of water including the rights of lower riparian shall be scrupulously respected and followed in accordance with 1991 WAA.

5.3 Water resources planning for development shall be done in coordination with the policies and projects of other sectors, both public and private and in accordance with planning and regulatory zones; as well as established good practices.

5.4 Irrigation projects must include a drainage component right from the planning stage.

5.5 Water resources plans shall include such conservation measures that would upgrade the available resource to the category of utilizable resource to the maximum possible extent. Due importance shall also be given to measures that would enhance efficiency of water usage.

5.6 Delineation of the following zones shall be promoted to ensure that within each zone the development of water is planned effectively:

- 5.6.1 Water Resources planning zones in areas where competition for limited water resources is high;
 - 5.6.2 Flood Risk Planning and Regulatory Zones in flood prone areas;
 - 5.6.3 Groundwater Management Planning and Regulatory Zones;
 - 5.6.4 Drought prone planning zones to ensure that adequate measures are in place when and where the droughts occur;
 - 5.6.5 Watershed Management Zones in upland areas;
 - 5.6.6 Environmental Management Zones in areas with environmental hazard;
 - 5.6.7 Crop ecological zones
- 5.7 The impacts of climate change on water resources development shall be assessed and monitored and remedial measures shall be reflected in the strategies of water resources planning, development and management.
- 5.8 For underdeveloped, water-scarce and poverty stricken areas, priority irrigation infrastructure shall be planned to benefit as large a number of people as possible to help them rise above poverty level.
- 5.9 Special economic evaluation criteria shall be applied in case of projects planned for less developed regions of the country.
- 5.10 Good practices for resettlement and compensation shall be applied for implementation of water sector projects.

6. ENVIRONMENTAL INTEGRITY OF BASIN

- 6.1 The environmental integrity of the Basin shall be sustained and upgraded.
- 6.2 Re-afforestation, soil conservation and improvement in land use in the watersheds shall be promoted.
- 6.3 Environmental flows shall be ensured in the rivers to maintain a sound environment for the conservation of the river ecology, morphology, delta & coastal ecosystem and fisheries.

6.4 A National Wetland Management Plan shall be adopted to conserve and protect wet lands and Ramsar Sites for the prevention of losses of wild life, flora and fauna and ensure that endangered habitats are registered, monitored and managed according to the overall needs of wetland species.

6.5 The development of water bodies shall be promoted where possible, for recreational use, water sports and fisheries.

6.6 The salt build up in the irrigated lands is recognized as a serious threat. Appropriate studies shall be undertaken to assess and mitigate its impacts.

6.7 Encroachments on natural streams, river beds and drains will be discouraged.

7. CONSERVATION OF WATER

7.1 The criticality of fresh-water for sustenance of human life, coupled with scarcity warrants recognition of water conservation to be accorded the highest national priority.

7.2 In the choice of conservation technology due care shall be exercised to select the most appropriate technology which:

- has the proven record of performance;
- is the economically viable option;
- has the potential to generate multi-benefits;
- is environment friendly.

7.3 It is recognized that the large annual and seasonal variability of fresh-water availability makes it necessary to:

- build large dams for system augmentation with consensus of all federating units;
- build small and medium dams for local and regional use;
- build check dams and delay action dams for recharge of aquifers and to reduce the flow velocities and erosion;

- recharge the underground aquifers during floods and surplus water flow periods for later use.
- provide subsurface dams, wherever feasible.

7.4. The Water Conservation Plans shall include:

- re-use and recycling of municipal and industrial waste water effluent after appropriate treatment at source;
- adoption of rainwater harvesting technology.
- adoption of water conservation techniques/technologies at the farm level.
- adoption of technology for sustainable use of drainage water in agriculture, horticulture and forestry sub sectors.

8. IMPACT OF CLIMATE CHANGE

8.1 The impacts of Climate Change like intensification of floods, erratic monsoon rains and frequent droughts are major concerns for Pakistan. Other likely effects on water resources could include:

- 8.1.1 Recession/boom of the Himalyan, Karakoram and Hindukush glaciers, threatening water inflows into Indus River System;
- 8.1.2 Increased siltation of dams and reservoirs caused by more frequent and intense floods;
- 8.1.3 Shorter duration of snowfall and its prolonged melting bringing drastic changes in mass balances;
- 8.1.4 Increase in the formation of glacial lakes outburst Floods (GLOF);
- 8.1.5 Increased intrusion of saline sea water in the Indus delta, adversely affecting coastal agriculture, mangroves and fisheries;
- 8.1.6 Rising temperatures resulting in enhanced heat and water-stress conditions, particularly in arid and semi-arid regions, leading to reduced agriculture productivity ;

- 8.1.7 With rise in temperature, as a result of climate change, crops will require more water due to excessive evapo-transpiration, cattle will consume more water and human consumption would also increase;
- 8.1.8 Precipitation pattern will become more complex, less predictable on long term basis with stronger regional variations than being experienced now;
- 8.1.9 Aquifer could be affected with negative impact on agricultural outputs.
- 8.1.10 To better understand how rainfall patterns will shift, local climate model should be prepared by pooling computing resources for adopting global climate models to local conditions through regional models.
- 8.1.11 Collaboration shall be worked out with international agencies and organizations specializing in weather simulation modeling, as well as active participation in new international initiatives for climate services.
- 8.1.12 The impact of climate change shall be minimized by storing water in carry over surface storages and in underground storages.
- 8.1.13 Adaptive measures both short & long term, shall be worked out to mitigate impacts of climate change.
- 8.1.14 The Policy measures related to water resources will be adopted in line with the provisions of the National Climate Change Policy (2012).

9. TRANSBOUNDARY WATER SHARING

9.1 A substantial part of Pakistan's fresh water resources is generated from outside the country. Indus Water Treaty (IWT) provides a mechanism for sharing of water of Indus system of rivers with India.

9.2 A mechanism shall be worked out for sharing of trans-boundary aquifers and joint watershed management including sharing of composite real-time flow information especially relating to hydro-meteorological disasters/disaster-like situations endangering Pakistan's important

infrastructure, communication network and economy. In this regard regional mechanisms may also be looked into for viable solutions to growing vulnerabilities of Pakistan to hydro-meteorological disasters owing to trans-border water releases and stoppages at critical times.

9.3 A study shall be carried out to evaluate the impact of developments in the upper catchment of Western Rivers on the environment, agriculture and hydropower projects, planned and existing, in the lower catchment besides the risk of damage and vulnerability to national infrastructure at large. It shall also recommend measures how to minimize these impacts within the framework of the Indus Water Treaty and international water laws.

9.4 Options shall be explored to preserve the environmental integrity of the system to reduce hazards faced by the population of areas of Eastern Rivers on the Pakistan Side keeping in view the rights of lower riparian.

10. IRRIGATED AGRICULTURE

10.1 Strategies and Action Plans shall be prepared to ensure Food Security for the people of Pakistan, and these shall be vigorously and diligently pursued.

10.2 The concept of "More Crop Per Drop" shall be pursued by, among others, the following:

- A national plan for implementation of improved irrigation methods and practices;
- Steps will be taken to promulgate a law banning flood irrigation throughout the country as early as possible
- Extensive research and development for new varieties of crops with high yields, lower water consumption, reduced GHG emissions, resistant to heat stress, drought tolerant and less prone to insects and pests;

10.3 Modernize irrigation network, so that it can meet the new challenges and the present-day expectations of the end-users.

10.4 The concept of participatory management of irrigation system shall be promoted and monitored with reference to its outcomes, to enable the

irrigation stakeholders to participate effectively in the decision-making processes.

10.5 Groundwater table shall be so managed that it does not impede crop growth or causes land salinity or underground saltwater intrusion.

10.6 Introduction of bio-fertilizers and bio-pesticides shall be encouraged to minimize ground water pollution.

10.7 The Water Apportionment Accord of 1991 is currently an accepted document and IRSA is mandated to implement the Accord. It is reiterated that IRSA has to implement the Accord in letter and spirit as per provincial share stipulated in the Accord.

10.8 Equity of water distribution between head and tail reaches shall be ensured and water allocations between various canal commands shall be rationalized, without violating the Water Apportionment Accord allocations

10.9 Huge reservoir of marginal quality of ground water remains underutilized. Incentives may be offered to farmers for use of this water for salt tolerant crops. However, before its implementation, a study shall be carried out to ensure that by adopting this measure, the saline water does not come up in the zone of marginal quality. The provinces shall carry out studies to establish effective measures for ensuring sustainability of soil health if use of marginal quality groundwater is opted.

10.10 Use of treated sewage shall be promoted for non-edible crops

10.11 Irrigation facilities shall be extended to new culturable command areas for growing low delta high value crops through improved irrigation methods/ technologies.

10.12 Water is a highly underpriced commodity in Pakistan. The prevailing cost recovery through water charges (Abiana) is able to meet only a fraction of the O&M cost of the irrigation infrastructure. Measures are required to enhance the water charges to realistic extent to meet the O&M cost of the infrastructure and to ensure long-term sustainability. Water Charges for industrial uses will also be rationalized.

11. RAIN-FED AGRICULTURE

11.1 Rain-fed agriculture is more prone to seasonal variability. In such a situation moisture conservation and rainwater harvesting can reduce the

reliance of this type of agriculture on direct rainfall. Provincial Agriculture Departments will be encouraged to establish specialized organizations for water resource development in rain-fed areas.

11.2 Rain-fed areas where groundwater is available at relatively shallow level, will be given preference for solar pumping. Incentives and subsidies will be provided, where viable.

11.3 Provincial governments would be encouraged to prepare large scale programs of RWH ponds and mini dams construction in rain-fed areas. Less water intensive varieties of crops and micro catchments shall be promoted.

12. DRINKING WATER AND SANITATION

12.1 Plans and initiatives shall be undertaken to progressively provide access to clean and safe drinking water and sanitation facilities to the urban and rural population of the country.

12.2 Full financial sustainability shall be aimed at for the Urban Water Supply and Sanitation Systems through effective reduction in wastage, theft and non-revenue water allocation and 100% metering, with effective safety-nets for the urban and peri-urban poor. Similarly, urban water tariffs must be revised to ensure financial sustainability.

12.3 The Rural Water Supply and Sanitation Services shall be priced at affordable rates.

12.4 Under no circumstances, shall the quality of drinking water, urban or rural, be allowed to fall below the specified standards. Each agency responsible for delivery of such services shall prepare Quality Monitoring Plans and shall be responsible for their rigorous enforcement.

12.5 The sources of water, surface as well as underground, shall be diligently protected from contamination and always maintained in a healthy state, through enforcement of legislation for controlling water pollution in coordination with provinces.

12.6 In remote area of the country, solar desalination of water will be promoted to provide the communities safe drinking water.

12.7 The groundwater levels have dropped to alarming depths and are falling further – potentially reaching the highly saline ancient sea water level in the coming few years. Alternative sources of surface water need to be urgently developed and adequate ground water re-charge ensured

12.8 Drinking water and sanitation plans will be adopted in line with the National Drinking Water and Sanitation Policies and Sustainable Development Goals.

13. URBAN WATER MANAGEMENT

13.1 Urban water management will elementally be integrated into overall water management of the country.

13.2 System losses in urban areas are a major issue which can be attributed to lower rates of recovery. Recovery will be enhanced and system losses will be reduced to the bare minimum.

13.3 Non revenue water in urban hubs need requires a coordinated effort. Public Health Engineering Department and WASAs will be encouraged to devise coordinated strategies under Provincial Action Plans

13.4 Industrial units and municipal entities will be required to treat effluents and hazardous discharge before disposal

13.5 At present, less than 1% of total wastewater in the country is treated before disposal. Treatment will be promoted at centralized level (in technical terms) at first and will be decentralized in due course of time

13.6 Drinking water supply will be aimed at provision of safe, affordable and sustainable supply of water to every citizen of Pakistan

14. HYDROPOWER

14.1 A nation's hydropower facilities are recognized as a vital natural resource and a key component in providing low-cost energy essential for development of the industrial, agricultural and service sectors.

14.2 The accelerated development of hydropower shall be treated as a high priority objective. Water projects, with power generation potential, shall be given preference. A matter of highest consideration for ranking of hydropower projects shall be the additional electricity cost in lieu of

transmission from the source to the National Power Grid System. Intensive effort would be required to secure funds.

14.3 Development of low-head hydropower projects on canals will be encouraged for distribution by power companies at local level. Such projects shall be undertaken by public or private sector or by community based organizations.

14.4 The Government shall encourage Private Power Producers for Hydropower Development, with appropriate safeguards and incentives.

14.5 Studies of integrated watershed management would be promoted in the Feasibility studies of hydropower projects for sustainable upland development and poverty reduction.

15. INDUSTRY

15.1 Industry is recognized as an important instrument of economic growth and provider of employment opportunities on large scale. The Water Policy accordingly classifies Industry as an important user of water, and the provision of its water needs shall be facilitated. A study shall be undertaken for enactment of legislation to formally allow and define the use of water abstraction licenses and water rates for industrial use.

15.2 Industry shall be required to carry out in-house treatment of their waste water before transfer to municipal sewer as per NEQ standards and the "Polluter Pays" principle shall be strictly enforced. Existing rules shall be strengthened for effective monitoring/control of pollution as per international standards. The standards of effluent disposal shall be strictly enforced.

15.3 Industrial expansion shall be promoted on larger industrial estates to facilitate waste water treatment and monitoring of effluent disposal. However, due to water shortage, recycling arrangements are essential. Siting of industrial estates shall take into account the constraints imposed by water availability and priority accorded for municipal and irrigation uses.

15.4 All measures will be taken to spread awareness about the dangers of water pollution. Public pressure would also be brought to bear on the polluters so that polluters can be fined after taking into account the extent of damage being caused and requirement of deterrence.

16. GROUNDWATER

16.1 The Indus aquifer, underlying the vast Indus plains, and other aquifers in valleys and in the hard rock formation are recognized as important national resources and deserve protection from pollution and unsustainable abstractions.

16.2 Monitoring efforts shall be strengthened to determine sustainable groundwater potential and prepare groundwater budgets for sub-basins and canal commands. All measures to prevent lateral/vertical movement of saline water interface shall be introduced. Provincial governments shall be persuaded to enforce legislation and take regulatory measures.

16.3 Various technologies used for sustainable extraction and skimming of fresh groundwater layers overlying saline water shall be evaluated and development of improved techniques initiated.

16.4 The transition of SCARP tubewells in the public sector to the private sector shall be expedited leaving development of fresh groundwater entirely to the private sector, as a local resource.

16.5 All sources of recharge/discharge and their interaction on groundwater reservoir shall be evaluated. Groundwater recharge including artificial recharge shall be promoted wherever technically and economically feasible. Abstractions from the aquifer shall be managed to the sustainable level that balances the recharge and boundary flows.

16.6 The Provinces shall be encouraged to prepare a Groundwater Atlas for each Canal Command and sub-basin delineating:

- Groundwater development potential;
- Water quality zones;
- Water table depth zones;
- Recommendations for installation of different types of tubewells.

16.7 Investment in groundwater recharge schemes shall be given due priority.

16.8 Secondary salinization due to indiscriminate groundwater abstraction shall be avoided by controlling or restricting pumping through enforcement of a strict regulatory framework.

17. WATER RIGHTS/OBLIGATIONS

17.1 All citizens of Pakistan have the right of equal and affordable access to clean drinking water and appropriate sanitation facilities.

17.2 According to the Constitution, the provinces have jurisdiction over the rivers and are responsible for the maintenance of flood protection dykes, flood control and drainage. However, due to inter provincial irrigation network, the federal government will continue to oversee the overall management and distribution of river water amongst provinces through IRSA

17.3 All users of water, public or private, shall have the right to receive water of specified quality at their premises of use; and they shall concurrently have the obligation to keep the quality of water within acceptable limits.

17.4 The provincial governments shall be responsible for the management of groundwater as per provincial government rules and regulations.

17.5 Provinces are responsible for routine repair and maintenance of flood protection dykes, flood fighting and drainage. However, in case of major catastrophe like the 2010 floods, the federal government will provide supplementary funds, in addition to the 50% which the federal government has already agreed to provide under NFPP-IV.

18. STAKEHOLDERS' PARTICIPATION

18.1 An enabling environment shall be created for active stakeholders' consultation and participation at all levels and in all aspects of the water resources including irrigation, drainage, domestic water supply, flood protection, drought mitigation, waste water treatment and pollution control.

18.2 Full support will be provided to build and strengthen water users' institutions for distribution, periodic maintenance, assessment and

collection of water charges and resolution of local disputes amongst users.

18.3 Participatory programmes shall be effectively coordinated with policies and programmes of all other public and private bodies to encourage partnership and to avoid conflicts. Women participation will be promoted in domestic water supply and promoted of water hygiene.

18.4 Management practices that enable community participation in the performance, operation and ownership of water assets shall be promoted.

19. SUSTAINABLE WATER INFRASTRUCTURE

19.1 The water-related infrastructure must have physical and functional sustainability for its design life and this requirement shall supersede all other considerations. All project proposals must certify that the applicable professional standards have been followed in the field of investigations, desk studies, designs, construction specifications and product quality, operational procedures and maintenance provisions.

19.2 This infrastructure shall be so engineered, constructed and operated that each component serves its designed purpose without undue wastage of water.

19.3 Each Agency in charge of infrastructure shall carry out periodic inspection of works under its charge and for this purpose prepare and update Inspection Manuals to bring these to the requirement of accepted good practice specifying, the periodic interval of each inspection, inspection procedures for each type of infrastructure and reporting authorities responsible for due remedial actions including surety of financial provisions at priority.

19.4 Equal priority shall be given to repair and maintenance, remodeling and rehabilitation and up-gradation alongside new construction while allocating funds.

19.5 It would be ensured that all barrages and bridges on major rivers would have sufficient capacity to safely pass floods of at least 100-year return periods.

20. WATERRELATED HAZARDS

20.1 Flood Management

20.1.1 The Flood Protection Plans (National as well as Local) shall be updated on a periodic basis using integrated and innovative approaches, removing technical shortcomings and learning lessons from the past major flood events;

20.1.2 Flood zoning shall be established and appropriate land use would be enforced by avoiding growth of such developments in flood hazard areas that would make the flood protection facilities vulnerable to failure. Where feasible, land use shall be adjusted to ensure compatibility with the frequency and duration of flooding;

20.1.3 Flood Plain Mapping and Zoning shall be carried out along River Indus and its tributaries (Kabul, Swat, Jhelum, Chenab, Ravi & Sutlej) and a River Act shall be prepared for restricting/ prohibiting permanent settlements in high and medium flood risk areas;

20.1.4 Reservoir Operational Rules shall be reviewed and optimized to ensure efficient and prudent decisions to control floods provided, however, that the safety of the dam, embankments, spillways, dam abutments, foundations and all other hydraulic structures is to be placed at no risk under any condition;

20.1.5 Effective use shall be made of non-structural measures like flood forecasting and early warning systems to minimize flood losses through better forecasts and warning, through additional forecasting facilities, e.g. radars, and other monitoring equipment and flood forecasting computer software incorporating rainfall-runoff and hydrodynamic models;

20.1.6 The construction of additional flood protection facilities and improvement of existing infrastructure shall continue where needed, concurrently with development of other measures specified here. Greater emphasis shall be laid on proper maintenance of the existing infrastructure and strengthening of vulnerable reaches of flood protection embankments;

20.1.7 The design and maintenance standards of existing barrages and flood protection structures shall be reviewed and changes made where necessary to bring them to the level of functional capability, reliability and safety;

20.1.8 Hill torrent management for conservation and mitigation of floods shall be given due priority;

20.1.9 Community based flood disaster management initiatives shall be encouraged for effective mitigation of flood hazards;

20.1.10 River flood classification shall be reviewed and enforced as per priority – main rivers, secondary rivers, tertiary rivers, nullahs, streams etc.

20.1.11 Level of Arboriculture shall be increased to work as water storages for reducing run-off and flood peaks;

20.2 Urban Storm Management

20.2.1 Drainage system of major cities shall be rehabilitated/ upgraded keeping in view the damages/ inconveniences caused to increased population and due to likely increase in short duration intense rainfall events attributed to climate change

20.2.2 Delineation of flood plains will be carried out and legislation would be recommended to impose a ban on all types of construction in those plains except that aimed at flood management.

20.2.3 Capacity of WASAs and other municipal level organizations will be built to deal with planning, execution and management of schemes aimed at prevention of urban flooding.

20.2.4 In the cities prone to urban flooding, dedicated warning systems will be installed to make accurate forecasts in the wake of extreme events induced by climate change.

20.2.5 Steps will be taken to promote bio engineering measures against urban flooding along with structural and non-structural measures.

20.3 Drought Management

20.3.1 Meteorological and other concerned Departments/Agencies shall be encouraged and supported in carrying out research work in reliably predicting droughts in short

and long term perspectives so that feasible and timely counter-measures can be taken through modified releases from reservoirs and other water management strategies. Research shall aim at developing appropriate mathematical models;

20.3.2 Provinces shall prepare Drought Management Plans (DMPs) for different drought prone areas and expected intensity of drought;

20.3.3 It is recognized that small surface water carryover storages suffer high losses, therefore, it is necessary to investigate the feasibility of using groundwater aquifers as water storage facilities. Cost effective technologies will also be explored for improving sailaba spate irrigation systems;

20.3.4 Flood water shall be diverted towards dry lands through escape channels to ensure more availability of groundwater and improved micro-environment to combat droughts;

20.3.5 In drought prone areas, non-water related economic activities shall be promoted and the available groundwater resource used for domestic purposes, livestock and social forestry. In such areas aquifer recharge facilities shall be given high priority.

20.4 Water Logging and Salinity

20.4.1 The menace of water logging and salinity continues to persist despite huge investments in this sector. A new approach that tackles the problem in a holistic manner on a basin-wide level shall be followed for future infrastructure development. In chronic problem areas, canal water allowances shall be reviewed and water management shall be improved;

20.4.2 The entire country shall be divided into distinct drainage basins and sub-basins. Inventory of all existing infrastructure shall be prepared to determine the need for additional measures;

20.4.3 A National Surface Drainage System shall be developed through consultation among the provinces for handling of saline and toxic effluents, making the province, generating such effluent, responsible for treating it before allowing it to flow into other provinces.

20.4.4 As far as possible, drainage effluent will be used at local level so as to minimize the need for disposal;

20.4.5 Plans will also be initiated to harvest rainwater within agricultural fields and within drainage catchments so as to flush the soil profile of salts and to avoid over charging of surface drains.

20.5 Seawater Intrusion

20.5.1 Seawater intrusion has posed serious threats to coastal agriculture and about 2 million acres of land have already been lost to this peril in Thatta, Badin and Sujawal districts of coastal Sindh. The situation requires meticulous monitoring and formulation of responsive strategies. An effective monitoring mechanism will be devised in consultation with provincial governments and NIO

20.5.2 Based on new realities of seawater intrusion and to conserve aquatic ecosystem, required environmental flows will be re-assessed and assured so as to address the issues on long term basis.

21. QUALITY MANAGEMENT

21.1 The water quality in rivers, reservoirs, lakes, canals, water bodies and coastal areas including groundwater shall be a national priority and its progressive improvement to acceptable standards of NEQS shall be achieved through improved agricultural drainage, municipal, rural and industrial wastewater treatment and safe effluent disposal. Full compliance with NEQS for drinking water shall be implemented vigorously in letter and spirit.

21.2 In the plans for water resources development, such measures shall be promoted that eliminate contamination of surface water bodies and groundwater aquifers beyond acceptable limits from industrial and domestic release or addition of pollutants, over-use of agro-chemicals and urban runoff. Full compliance with NEQS for wastewater disposal shall be implemented vigorously.

21.3 Detailed Action Plans shall be prepared by concerned agencies to ensure compliance, supported by credible evidence of regulatory capacity, institutional strengths and financial resources.

21.4 A study shall be initiated at federal and provincial level to establish and implement a National Water Quality Monitoring Programme which will:

- Establish water quality standards for different uses and for surface and groundwater;
- Develop standards and regulations for effluent disposal;
- Develop a comprehensive programme of water quality monitoring;
- Support development of an Information Management System for data storage and assessment.

21.5 The responsibility of polluter, public or private, shall be enforced through strengthening of existing regulations for protection of public health and environment.

22. INFORMATION MANAGEMENT

22.1 The national information base shall be improved by developing a national planning database which will:

- Support an integrated information system in order to enable the planning and development of water and other related resources on a sustainable base, including data on glacier melt and snow melt.
- Consolidate information and data from all monitoring and research agencies and make it easily accessible to public free of cost with coordination mechanism where necessary.
- The laws, rules and guidelines approved under the National Water Policy will be uploaded and updated on the national water web, so that all stakeholders and experts can access them easily.

22.2 The quality of data shall be improved through strengthening of monitoring organizations as well as the management of data and information at the national level by restructuring and strengthening existing agencies, where appropriate, so as to facilitate systematic data collection, processing, archiving and retrieval.

22.3 A policy of data sharing within and amongst all water-related organizations shall be encouraged, and dissemination through Information Technology (IT) shall be promoted.

22.4 Discharge measurement structures including all diversion points shall be calibrated after every five years or at shorter intervals depending upon how rapidly the changes occur in the flow conditions and stream morphology.

22.5 The information technology based monitoring system at all diversion points from the rivers and reservoirs shall be refined, upgraded, uniformly calibrated and effectively managed to guarantee availability of reliable real-time data to IRSA, WAPDA, Provincial Governments and major users.

22.6 Efforts shall be made to expand the information technology based monitoring network to cover those parts of catchments of the rivers that lie in occupied Jammu & Kashmir and outside Pakistan besides to include tributary rivers (secondary, tertiary etc.).

23. PUBLIC AWARENESS

23.1 People are the prime stakeholders of water sector. This policy recognizes that no substantial success can be achieved without active and meaningful participation of the masses.

23.2 There is a need to raise awareness among people to conserve water being central to sustenance of all kinds of life. For this purpose, media will be taken on board through relevant regulatory bodies to launch a comprehensive public awareness campaign.

23.3 Awareness regarding conservation of water will be incorporated in syllabi/curricula at primary, secondary and tertiary levels of education.

23.4 Provincial Irrigation Departments and Water Management Wings of Agriculture Departments shall make public awareness programs an integral part of their organizational functions.

23.5 Agriculture Universities shall be encouraged to not only play their role in raising awareness but initiate/upgrade higher level academic programs in water conservation and management.

24. RESEARCH

24.1 A National Agenda for research in water and water-related issues shall be prepared and periodically updated which shall become a blueprint for national action plan. The Agenda will include model building to forecast glacier melt and snow melt in the coming years.

24.2 National research agenda shall receive high priority in resource allocation, both human and financial and shall cover public and private sector research organizations and universities.

24.3 The existing Federal and Provincial research organizations/institutes shall be properly strengthened and equipped to implement the National Agenda.

24.4 Incentives shall be offered for high quality research. A national award, Pakistan Water Prize, shall be conferred every year upon a Project Manager or Researcher for extraordinary contribution.

24.5 At least one percent of the base cost of projects shall be allocated for research and monitoring.

24.6 Better coordination between field and research institutes and organizations shall be promoted to achieve these goals.

25. ECONOMIC AND FINANCIAL SUSTAINABILITY

25.1 The delivery services of water for all its uses shall be made economically and financially sustainable and the social, as well as economic value, of water shall be emphasized.

25.2 Water at the delivery point shall be realistically priced according to a general principle that:-

- For production sectors of the economy, full cost recovery shall be effected;
- For social uses, the concept of affordability shall be applied;
- For environmental and ecological needs, water supply shall be free of cost.

25.3 Wherever subsidy becomes inevitable, it shall be carefully estimated and the source of its financing would be clearly indicated; provided that the source shall be such as to have adequate resources for subsidy financing. The extent of subsidy shall be periodically reviewed and adjusted.

26. DEMAND MANAGEMENT

26.1 It is recognized that fresh water, being a finite resource, cannot fulfill unlimited demand of numerous users. Demand Management of various uses shall, therefore, be accorded high priority.

26.2 Rapid population growth is recognized as the dominant factor in multi-dimensional increased water demand. Appropriate Action Plans shall be formulated by the concerned agencies to manage these increases.

26.3 Demand Management Plans shall be prepared for all uses, specifying measurable targets, and shall be rigidly enforced.

26.4 Water use efficiency in all sectors shall be vigorously pursued, and towards this end all avenues like professional, administrative, legal, technologies transfer and research application coupled with appropriate economic and financial incentives shall be explored.

27. LEGAL FRAMEWORK

27.1 As the National Environmental Policy (2005) and National Climate Change Policy (2012) have already been approved, therefore, all relevant provisions in these policies related to water sector shall be implemented in letter and spirit besides the relevant provisions relating to resilient irrigation/flood infrastructure as envisaged in National DRR Policy approved in 2013.

27.2 All water-related Acts shall be reviewed for updating. Where appropriate, they shall be integrated through a smaller number of more comprehensive and updated Acts in order to eliminate overlaps.

27.3 The appropriateness and need of each water-related institution to have a supporting legal cover shall be examined; where found necessary for institutional effectiveness; such a supporting legal cover shall be provided.

28. MAIN TARGETS AND INVESTMENT REQUIREMENTS

28.1 Pakistan's water resources comprise surface water and ground water.

a) **Surface Water** – Our river flows are heavily dependent on glacial melt (41%), snowmelt (22%) and rainfall (27%). The Indus River System receives an annual influx of about 138.4 Million Acre Feet (MAF) of water. Pakistan receives snowfall only in the Northern Areas of the country during winter. Rainfall is markedly erratic in magnitude, time of occurrence and aerial distribution. The mean annual precipitation ranges from less than 100 mm in parts of the Lower Indus Plain to over 750 mm near the foothills in the Upper Indus Plain.

b) Pakistan is mainly dependent on the three western rivers of the Indus (including Kabul, Jhelum and Chenab). Post-Tarbela (1976-2008) flows (Indus at Kalabagh, Jhelum at Mangla and Chenab at Marala) were 137 MAF. The three eastern tributaries of the Indus – Ravi, Sutlej and Beas – were allocated to India for its exclusive use. Currently about 1.4 MAF of water flows from India to Pakistan through these eastern rivers. Also included in Pakistan's total surface water is 21 MAF from the Kabul River.

c) **Ground Water** – Pakistan is extracting 50 MAF from the aquifers and already crossed the sustainable limit of safe yield. This over-mining and pollution of aquifers has resulted in secondary salinization and the presence of fluorides and arsenic in water, which in turn is degrading the quality of agricultural lands.

28.2 The Indus Waters Treaty led to the construction of multiple hydraulic structures. These enabled Pakistan to enhance water availability at canal head works to about 104.0 MAF. However, this has now started decreasing because of the lack of surface water development since construction of Tarbela dam and the significant loss of on-line storage capacity through sedimentation. Of the 104.0 MAF of annual canal diversion, only 58.3 MAF reaches the farm-gate, while remaining 46.7 MAF seeps into the ground water.

28.3 Water Availability can be enhanced through reduction in water loss, additional water storage through large, medium and small dams, cycling used waters, desalinization of sea water and more efficient water use. An important aim of the National Water Policy is to fix quantifiable targets in each of these sub-sector with a timeline and estimated resources required over the next twelve years i.e. by 2030.

28.4 Main Targets proposed for 2018-2030 can be summarized as follows:

- (i) Reduction of 33 percent in the 46 MAF river flows that are lost in conveyance, through accelerated programme of water course lining specially in saline or semi saline areas.
- (ii) In order to augment the dwindling irrigation deliveries into the existing canal systems on account of ever decreasing existing storage capacity of Mangla and Tarbela due to sedimentation and to develop new cultivated area on canal irrigated water, the existing water storage capacity of 14 MAF shall be increased by immediately starting construction of the Diamer-Basha Dam Project having 6.4 MAF live storage on which consensus of all the federating units has already been achieved in 2009 at CCI level. The existing water storage capacity will be increased up to 10 MAF including Diamer-Basha Dam.
- (iii) Increase of at least 30 percent in the efficiency of water use by producing “more crop per drop”. This will require use of new technologies like drip and sprinkler irrigation and more realistic water pricing policy. The present average rate of water charges per acre is only one fourth of what the farmer pays for tube well water in the ground water market.
- (iv) Gradual replacement and refurbishing of decades old irrigation infrastructure in accordance with an adequate asset management plan.
- (v) Real-time monitoring of river flows by IRSA is to be ensured through inter alia telemetric monitoring to maintain transparent water accounting system and to check the increasing trend of unaccounted-for water in the Indus System of Rivers. This task should be completed before the end 2021.
- (vi) In order to establish and maintain a reliable assessment of water resources in the country, federal and provincial water sector organizations would develop a standardized and

uniform mechanism for data collection of various parameters of water resources including but not limited to rivers/canals gauge and discharge, rainfall/snowfall, depth to groundwater table, surface/ subsurface water quality parameters, river/canal and reservoirs sedimentation.

28.5 The tentative targets proposed in this policy will be firmed up in consultation with the Provinces and incorporated in the 12th Five Plan (2018-2023) and 13th Five Year Plan (2023-2028).

28.6 In addition to these over all national targets, the Provincial Governments can formulate their own targets for watershed management, aquifer recharge, ground water extraction and drainage as a part of their respective Master Plan for Water

Investment Requirements

28.7 A major reason for the current water crisis is lack of adequate allocations in the Public Sector Development Programme for the Water Sector. As a result there has been virtually no increase in the total cropped area of 55 MA in the past two decades. The table given below shows annual allocations for water sector over the past 18 years;

Year	Share %	Allocation (Rs. Billion)	Year	Share %	Allocation (Rs. Billion)
2000-2001	8.4	10.123	2009-2010	13.0	37.57
2001-2002	6.9	9.000	2010-2011	12.0	34.65
2002-2003	12.2	11.384	2011-12	12.00	36.14
2003-2004	12.7	15.728	2012-13	14.5	51.21
2004-2005	12.0	25.417	2013-14	10.7	57.84
2005-2006	17.0	41.422	2014-15	8.5	45.93
2006-2007	18.0	57.048	2015-16	4.3	30.12
2007-2008	13.0	70.900	2016-17	4.00	31.71
2008-2009	14.0	41.71	2017-18	3.7	36.75

28.8 In 2017-18, Federal PSDP allocated only 3.7% or Rs. 36.75 billion for the water sector, which is lowest in two decades. However as shown in the following table, there has been a significant increase in the provincial allocations for the water sector during the past 5 years:

Water Sector Provincial Development Expenditure 2012-13 to 2017-18

Year	(Million Rupees)
2012-13	45,582
2013-14	38,398
2014-15	47,030
2015-16	57,482
2016-17	95,820
2017-18	105,575
Total:	389,887

28.9 Taken together and considering the paramount priority which this sector deserves, the total allocation of Rs. 145 billion i.e. 7 percent of the combined federal – provincial development budget for 2017-18 is totally inadequate.

28.10 National Water Policy recognizes the need to ensure that water sector receives at least 10 percent of Federal PSDP allocation in 2018-19, gradually increasing to 20 percent by 2030. Correspondingly the Provincial Governments may also increase their development expenditure for this sector.

28.11 Sub-sector wise estimates of investment needed by 2030 are given in the table below;

(Rs. Billion)

Sub Sector	Investment	Major Projects
Storage	1,600	Di Amer-Basha Dam, Mohmand Dam
Conservation	800	HEIS Projects, lining of distributaries and minors, telemetric monitoring, improvement of conveyance efficiency
Drainage	150	RBOD-I, RBOD-II and RBOD-III, new reclamation projects
Flood Control	186	National Flood Protection Plan-IV (NFPP-IV)
Rehabilitation of Irrigation System	300	Rehabilitation of barrages, headworks and canals
Research 1% of total	30	IWASRI Research Program, GMRC, Hi-AWARE

In addition, sectors that can benefit from PPP modalities and private sector participation (like urban water and sewage for example) should immediately be opened up for investment through appropriate policies. The introduction of private capital and discipline in project execution will not only introduce cost savings and efficiency during implementation but will also save time and create a competitive environment. However, it will have to be ensured that a public utility like water is not exploited for profit and the strictest regulatory standards are maintained. Fortunately,

Pakistan has successfully undertaken private investment in the power sector so there is a readily available model that can be emulated.

29. CAPACITY BUILDING OF WATER SECTOR INSTITUTIONS

29.1 The integrated management of water resources requires the highest level of skills and knowledge to effectively address the looming water crisis. In fact, the real challenge is not just listing “*what*” needs to be done, because that is well known, but “*how*” to do it and “*who*” will do it, with a clear time lines. This is exactly what this policy has aimed to achieve.

29.2 Capacity Building of all water related Public Sector Organizations at Federal and Provincial level shall be given high priority to equip and improve their performance in order to generate capacity for:

- Design, develop, upgrade, maintain and manage the water resources infrastructure according to national needs and optimum standards.
- Meet future challenges of increased demand and finite water resources.
- Meet challenges of climate change and demographic constraints;
- Ensure Integrated Water Resources Planning, Development and Management.

29.3 It is of paramount importance that an effective and responsive institutional structure is decentralized for implementation of this Policy that supports linkages between policy, practice, science and decision making, so as to facilitate at various levels, the sustainable solutions for water resources planning, development and management. The new priorities for the water sector that will be spelled out in the proposed increase in financial allocations for the water sector will be of limited value unless and until the institutional capacity for policy formulation and management capacity for project implementation is upgraded in a holistic manner.

29.4 It is recognized that an effective institution is one that has a clear mandate, a legal framework, a well-structured organization with clear responsibilities and accountability at various levels, professionally competent engineers and other professionals with a clear mandate and operational autonomy.

29.5 New and vibrant institutions are required at four levels i.e. planning, regulation, development coordination and management. The following institutional framework will be adopted and gradually strengthened:

29.5.1 **National Water Council**: A national body named as “National Water Council” (NWC) shall be established with the following composition:

1. Prime Minister of Pakistan	Chairman
2. Federal Minister for Water Resources	Member
3. Federal Minister for Power	Member
4. Federal Minister for Finance	Member
5. Federal Minister for Planning, Development & Reform	Member
6. Chief Ministers of Provinces and one Provincial Minister Nominated by the CMs	Members
7. 5 Private sector members from water related disciplines	Members
8. Secretary, Ministry of Water Resources	Secretary

(**Note:** The Prime Minister AJK and Chief Minister G.B. will be invited to the meetings of NWC.)

29.5.2 The National Water Council shall meet at least once a year and perform the following functions:

- (a) Review and coordinate implementation of the National Water Policy and National Water Sector Strategy in the country and periodic updating of the same;
- (b) Recommend legislation, policies and strategies for water resources development and management in the country;
- (c) National planning and coordination for water resources development and management activities among concerned organizations at federal as well as provincial government level to achieve objectives of NWP;
- (d) Review all major interprovincial water-related projects and activities in the fields of irrigation, drainage, flood control and hydropower where federal funding is involved to ensure optimal and economical use of water resources;
- (e) Create an enabling environment that shall promote broader multi-stakeholders’ participation and integrated water resources management with due consideration for environment and ecology;

- (f) Review in consultation with concerned organizations the progress in controlling pollution of water bodies including rivers, streams, lakes and groundwater;
- (g) Coordinating water resources database service at different level;
- (h) Any other functions, which the CCI may assign to the Council.

29.5.3 The Ministry of Water Resources will serve as the Secretariat of the NWC. In view of the additional functions to be assigned to the existing organization, a Policy Implementation Cell shall be created with new posts.

29.5.4 A Steering Committee on water will assist the NWC by ensuring inter-provincial coordination and reviewing policy papers and monitoring reports before submission to NWC. The composition of the Steering Committee will be as follows:

(i)	Federal Minister for Water Resources	Chairman
(ii)	Secretary, Ministry of Water Resources	Member
(iii)	Secretary, Ministry of Power	Member
(iv)	Secretary, Ministry of PD & Reform	Member
(v)	Secretary, Ministry of Finance	Member
(vi)	Chairman WAPDA	Member
(vii)	Chief Engineering Advisor	Member/Secretary
(viii)	Chairman NDMA	Member
(ix)	Surveyor General of Pakistan	Member
(x)	Chairman Pakistan Engineering Council	Member
(xi)	Provincial Irrigation Secretaries	Members
(xii)	Secretary (Works), PWD, Govt. of Gilgit-Baltistan	Member
(xiii)	ACS Fata Secretariat	Member
(xiv)	Secretary, (Irrigation & Small Dams), Govt. of AJ&K	Member

(Note: Depending upon the agenda other stakeholders can be invited)

29.5.5 The Steering Committee shall meet twice in a year or more, frequently whenever deemed necessary.

29.5.6 **Provincial Water Authorities:** At the Provincial Level, the Irrigation Departments play a major role in water resource

management but have been facing growing problems arising from water theft and inequitable water distribution for the tail enders. In 1995, a programme of institutional reform was introduced, with autonomous and self-financing Provincial Irrigation and Drainage Authorities (PIDAs), Area Water Boards (AWBs) and Water Users' Associations. Punjab has also created a Directorate of Land Reclamation. AWBs started well but their performance is not uniformly positive in all provinces. In view of the growing responsibility of Provinces after the 18th amendment, it is necessary to upgrade the provincial capacity to design and construct small and medium sized dams and irrigation infrastructure. This will require attracting highly qualified engineers and professionals with requisite experience.

29.5.7 **Revitalization and Re-structuring of WAPDA-** Over the years WAPDA had built up a very large pool of engineers and successfully completed its mandate of building many large dams and hydro electric projects and link canals. But with the passage of time, it became too large for efficient management.

In 2017, WAPDA was bifurcated and its Power Wing, except hydro projects was placed under a new organization called Pakistan Electric Power Company (PEPCO). So in effect, WAPDA is now exclusively responsible for water sector, but most of its planning and design capacity has been transferred to PEPCO.

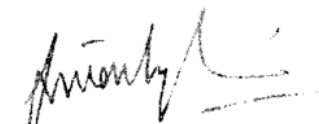
There is urgent need to upgrade and improve the capacity of WAPDA to plan, design and undertake feasibility studies and implement major hydro-electric projects. Under this policy, the Ministry of Water Resources will be responsible to propose and implement the re-structuring plan to upgrade WAPDA within a year after the approval of the policy.


29.5.8 **Ground Water Authority**-As a part of these institutional and functional arrangements, it would be paramount to establish regulatory bodies for ground water, with strict yet expeditious regulation mechanism and regimes to ensure sustainability, transparency, efficiency, safety and affordability. For this purpose, a new organization “Ground Water Authority” will be established in each province. This organization will Issue, establish and enforce standards for the development and utilization of ground water.

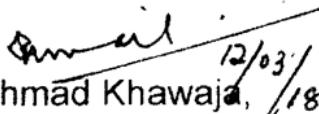
29.5.9 Federal Water Resources Division will prepare, in consultation with the Provincial Governments, a consolidated PC-I Project to cover the initial cost of capacity building of Water Sector Institutions at the Federal and Provincial level for a period of 5 years keeping in view the relevant priority of each province.


29.6. The Water Resources Division will submit periodical reviews to the Council of Common Interests on the implementation of National Water Policy to ensure inter-alia, that the policy objectives listed in Section 2 are achieved in a timely and cost effective manner.

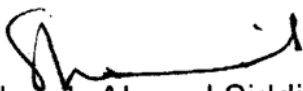

Mr. Sartaj Aziz
Deputy Chairman
Planning Commission

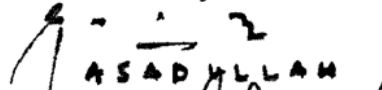

Mr. Awais Ahmad Khan Leghari,
Federal Minister for Energy
(Power Division)
Ministry of Energy



Syed Javed Ali Shah,
Federal Minister for Water
Resources
Ministry of Energy

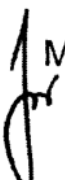

Mr. Shamail Ahmad Khawaja,
Federal Secretary,
Ministry of Water Resources

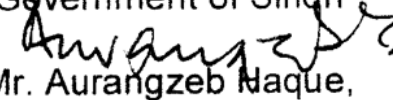

Mr. Yousaf Naseem Khokhar,
Federal Secretary,
Ministry of Energy (Power Division)


Mr. Shoab Ahmed Siddiqui,
Secretary
Ministry of Planning, Development and Reform


ASADULLAH
Capt. (Retd) Zahid Saeed,
Chief Secretary, IRRIGATION
Government of Punjab


JAMAL MUHAMMAD
Mr. Rizwan Memon,
Chief Secretary, Irrigation,
Government of Sindh


Mr. Muhammad Azam Khan,
Chief Secretary,
Government of Khyber
Pakhtunkhwa


Mr. Aurangzeb Naque,
Chief Secretary,
Government of Balochistan

Shehzad Bughra