

RESEARCH PAPER

Water Management and Reservoirs in Pakistan: An analysis of Legal Framework and Contemporary Challenges

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ABSTRACT

The goal of this work is to discuss laws and situation of shortage of water reservoirs in Pakistan. It explains the existing water reservoirs and sources in Pakistan. It also analyses the existing legal framework on the subject to find out loopholes. The need of water is a collective need for every human being around the globe. In Pakistan, as per Indus River System Authority (IRSA), "total river flows at rim stations were recorded at 486,600 cusecs in 2018 compared to total outflows of 258,800 cusecs. All main rivers — including the Indus, Jhelum, Chenab, Ravi and Sutlej rivers — flow normal, except the Kabul river. The conservation level at Tarbela and Mangla was reported 1495.27 feet and 1141.50 feet, respectively". The methodology used in this paper is qualitative and an analytical method will be followed up. It highlights contemporary challenges for access to water in Pakistan. It argues that right to clean water is a basic human right that needs special attention. In Pakistan, there is need to enhance the storage capacity of water by constructing Dams or large storage places to overcome water shortage. Pakistan has experienced shocking effects of floods because of shortage capacity and there is lack of water reservoirs within state. It is need of the hour to take immediate and necessary steps for storing water in Pakistan.

KEYWORDS Water Reservoirs, Pakistan's Storage Capacity, Challenges, Right To Water, Water Shortage In Pakistan

Introduction

Water is essential for human beings. Water is a basic human need in life and a human right (Khan, et. al., 2022). The right to life is recognized in Article 9 of the Constitution of Islamic Republic of Pakistan, (1973). The Report of PILDAT provides that: "Pakistan is today one of the most water stressed country in the world and with every passing day the stress is worsening. Prevailing problems that include an extremely high population growth rate, reliance on a single river system, the fast-changing global climatic conditions and a national failure to harness 40 MAF (Million Acre Feet) of water annually falling unused in the Arabian Sea are the main contributors to this worsening situation" (Report PILDAT, 2020).

Unfortunately, these problems are not going to solve by the Governments as well as people are not solving themselves. Although the legislation is there for protection of people's right but water reservoirs and sources of water in Pakistan are limited. In this context, this article is divided into V Sections. Section I is introductory. Section II discusses water Reservoirs and sources of Water in Pakistan. It highlights main rivers in Pakistan. Section III provides an analysis of Laws in relation to water reservoirs in Pakistan. Section four highlights contemporary challenges for access to Water in Pakistan based on previous section. It discusses the strategy to meet the problem of water shortage and National Water Emergency. Finally, conclusion is in the last section.

Literature Review

The geological survey provides that: "Water, a finite commodity, has a direct bearing on almost all sectors of economy. In Pakistan its importance is more than ordinary due to the agrarian nature of the economy. Pakistan has the widest irrigation system in the world. There are five major rivers of Pakistan which are filled by several small rivers. The most widely spread canal system is of great importance and supplement to the agriculture of the country. Among the available resources of water in Pakistan, the river water is the biggest one". There are five major Rivers of Pakistan (Geological Survey of Pakistan, 2017). To discuss water reservoirs and available sources of water, it is necessary to highlight major rivers and Dams in Pakistan.

Major Rivers of Pakistan

The Indus: "The creation of the embryonic Indus river system, the main source of surface water in South Asia, most likely began 50 million years ago when the Indian plate, Gondwanaland, first collided with Eurasia, Angara land and formed the Himalayan Mountains in the Mesozoic era. The Indus River system comprises of three major reservoirs, 16 Barrages, 2 head-works, 2 Siphons across major rivers 12 inter link canals, 44 canal systems (23 in Punjab, 14 in Sindh, 5 in Khyber P and 2 in Baluchistan) and more than 107000 water courses". The Approximately the area and length of the canals which are coming from Indus River are round about 56073 Kilometers. It comes and its basic fountain a place which called Singikkahad Manswar. Indus River's length is equal to 2700 Kilometers and total covering Area is 404220 Kilometers. Annually flow of the River (Average) 48 MAF.

The Chenab: River of the Chenab is comes from a district of Kangra which is the part of Indian state of Hmachal Perdesh. Chinab, s main streams which called Chander and Banger have rise on the 16000 of the feet. "These join at Tandi in the state of Jammu and Kashmir. Feed by innumerable tributaries on the long journey from its headwaters, the river gains immense power region above Kashmir. In enters Pakistan through Sialkot near Diawara Village".

"The Chenab flows through the alluvial plains of the Punjab province. It is then joined by the Jhelum River at Trimmu, 64 km downtowns of Trimmu, the river Ravi joins it. The Satluj joins Chenab upstream of Punjnad and finally at above 64 km below Punjnad it meets of river Sindh at Mithankot. The river Chenab has Marala, Khanki, Punjnad, Trimmu and Qadirabed Barrage and Marala Ravi link Canal. India has constructed Salal Dam in Jammu about 40 miles upstream of Marala Barrages. The length of the river is 724 km and area is 41656 km. The annual average flow is 12.38 MAF".

River Sutlej: Sutluj River is the so longest river due to which name of Punjab means Land of five rivers came to exist. It starts from the Indian occupied territory Tibet's mountains range and its flows from north and west of Hamalyas ranges and then its cross the Indian state Hamachal Perdesh and on the site of Hoshyar district of Punjab it enters in Plain area. Then it's run in Indian Punjab and after that it join the Bias River till the 105 km on India Pakistan Boarder and before entering into Pakistan its join the Chenab River near to District of Bahawalpur. The length of the river is 1450 km. The length of the river in Pakistan is 526 km and area is 65932 km. The annual average flow is 0.021 MAF.

River Jhelum: "The Jhelum River is a large eastern tributary of the Indus. It rises from a deep spring of Vernag, in the Indian-held Jammu and Kashmir state. The river moves North-West ward from the Northern slope of the Pir Panjab range to Wular Lake. At Mazaffarabad, the Jhelum joins the Kishanganga River and then bends Southward forming part or the border between Azad Kashmir and Khyber Pakhtunkhwa. Near Mangla, it breaks through the Siwalik range into broad alluvial plains. At Jhelum town the river turns South-West ward to Khushab and then bends southwards to join the Chenab River. The

Mangla Dam is one of the biggest dams of Pakistan built on Jhelum River and its reservoir irrigates about 3,000,000 acres of land and has an installed capacity of 300 MW of electricity." The length of the river is 725 km and its length in Pakistan is 379 miles. The catchment Area is 21359 miles and annual average flow is 11.85 MAF".

River Ravi: "The Ravi is the smallest of the five main eastern tributaries of Indus. It rises in the Himalauans in Himachal Pardesh (India) and flows west – Northwest past Chamba, turning Southwest at the boundary of Jammu and Kashmir. It flows past Lahore and turns west near kamalia, employing into the Chenab River South of Ahmadpursial after a course of about 764 km. The length of river in Pakistan is 675 km. Important Engineering's are alloki and Sindh nai head works. The catchment area is 25185 km and annual average flow of the river is 1.47 MAF".

Data of large Dams in Pakistan

According to the International Commission on Large Dams (ICOLD) , "total dams and reservoirs in Pakistan over the height of 15 m (49 ft) are 143 (Report ICOLD, 2012). As per ICOLD, dams with height above the foundation greater than 15 meters (49 ft) are known as large dams". The list of most important large dams in Pakistan is are as follows: (i) DhokTallian Lake Dam; (ii) Ghazi Barotha Dam; (iii) Gomal Dam; (iv) Hub Dam; (v) Karoonjhar Dam; (vi) Khanpur Dam; (vii) KurramTangi Dam; (viii) Mangla Dam; (ix) Mirani Dam; (x) Misriot Dam; (xi) Rawal lake Dam; (xii) Sabakzai Dam; (xiii) Shakidor Dam; (xiv) Simly Dam; (xv) Tanaza Dam; (xvi) Tarbela Dam; (xvii) Mangla Dam; and (xviii) Warsak Dam (Water Statistics of Pakistan, 2020).

"Pakistan has an area of 796,095 km located just to the south of Himalayas, Hindu Kush, Karakoram and its associated ranges. The Indus River System (IRS) has its origin and end in this region. Annual rainfall in the upper catchment is less than 800 millimeter (mm), gradually tapering down to just 125mm in the southern parts of Sindh". Pakistan irrigation system is the largest irrigation system of the world which have large number of canals whose capacity is 145 Million Acre feet per year. Pakistan fullfill his 90% of food need from this irrigation system This measure 75 Million Acre Feet is going to be used for agriculture purpose, 35 Million Acre Foot is not managing well and remaining 35 Million Acre foot is throwing into the sea every year in monsoon. "The Indus and its tributaries are from one of the world's largest river systems. At the time of partition of Pakistan and India, its average annual flow was 168.3 MAF (89.5 MAF from Indus at Kalabagh, 22.6 MAF from Jhelum at Mangla, 23.5 MAF from Chenab at Marala, 6.4 MAF from Ravi at Madhopur, 12.7 MAF from Beas at Mandi Plain and 13.5 MAF from Sutlej at Rupar Head Work".

India and Pakistan both are came to exist in 1947. But former have 3200 large dams and later have just 150. In spite of this after partition major portion of canals comes in Pakistani part (Report Water Statistics, 2018). Pakistan showed negligence and not built water reservoirs. It's the need of time that we think for national interest rather than local interest and immediately starts to steps on construction on new dams.

"Pakistan by many national and international organizations is considered among the countries which will be severely hit by the growing water scarcity in the wake of global warming and world ecological disorder. Severity of the issue and the view prevalent in this regard can be judged from the following studies". Pakistan Planning Country Environmental Analysis Report, (2007) describe that", "*Water availability per person has drastically fallen from about 5,000 cubic meters in 1947 to 1,100 cubic meters. It projects that water availability will hit below 700 cm per capita by 2025* (Report, 2007).

World Bank published a report in 2005 and reveals that,

Pakistan is already one of the most water-stressed countries in the world, a situation which is going to degrade into outright water scarcity (Briscoe & Qamar, 2005).

Asian Development Bank also published a report in 2007, in which describe that Pakistan's status as under: *Nearly at water scarcity threshold of 1,000 cubic meters/person/year.*

The Economic Survey of Pakistan conducted in 2010 described that per head water availability in Pakistan is 1066 MM per head. Although Pakistan has rivers and Dams but don't have polices to make our water safe. According to Pakistan's Constitution, water is largely a provincial subject, but the federal government has also to perform functions and responsibilities relating to inter-provincial matters. This discussion necessitates analysis of laws in Pakistan.

Material and Methods

The research methodology in this study is qualitative and analytical method is followed. The material and data are taken from Books, Articles, Reports, Laws and technological sources.

Results and Discussion

There are number of legislative acts that govern water issues in Pakistan, namely:

Provincial Irrigation and Drainage Acts of 1873

The Provincial irrigation and Drainage Act of 1873 is the most comprehensive legislation aimed to control and regulate the entire irrigation and drainage system and to ensure the supply of irrigation water from the canal system to farmers. Under this law the field officers have been given the magisterial powers to control encroachments and to ensure equitable irrigation supplies.

Water and Power Development Authority Acts of 1958

The Water and Power Development Authority was created at the Federal level in 1958 through the WAPDA Act. Its mandate is to undertake construction of large irrigation and drainage projects and for construction and operation of large hydropower projects. The Authority is also responsible for generation, transmission and distribution of power in the country.

Indus River System Authority Act of 1992

The IRSA Act, formulated in 1992, implements the Water Accord which apportions the balance of river supplies, including flood surpluses and future storages among the provinces.

Establishment of Indus River System Authority (IRSA)

Indus River System Authority (IRSA) was established in 1993 through an Act of the Parliament. The authority was established for regulating and monitoring the distribution of water sources of the IRS amongst the provinces in accordance with the provision of the Water Accord. IRS oversees the allocation based on the seasonally available supplies, however the allocation of the water received by a province for different uses remain provincial subject.

Environmental Protection Act of 1997

Pakistan Environmental Protection Ordinance (PEPO) was issued in 1983. It has been replaced with the Pakistan Environmental Protection Act, 1997. The Act is directed to provide a basic environmental policy and set up a management structure for pollution control. Proper enforcement of the Act "will result in improved water quality in various water bodies as the disposal of untreated municipal and industrial wastes will be controlled.

The Punjab Soil Reclamation Act, 1952

The Punjab Soil and Land Reclamation Act of 1952 provides legal basis for implementation of salinity. "Control and Reclamation Project (SCARP) to control the water logging and salinity. The act empowers the Department of Irrigation to license and control groundwater in any area notified as problem area by the government. The Department of Irrigation has the authority to exercise all the powers under the Act. The Act was later extended to cover the whole country".

Water Users Association (WUA) Ordinance, 1981

"The Water User Ordinances was promulgated in 1982 to enable formation of Water User Associations (WUAs) for participation in water management at water course level. The WUAs made a good start by participating in improvement of more than 10,000 water courses but after the completion of improvement works became dormant".

The Provincial Water Accord, 1991

"In 1991, an agreement to share waters of the Indus River was reached between the four provinces of Pakistan in the form of the Water Apportionment Accord (WAA). This accord is based on both, the existing and future water needs of the four provinces".

Provincial Irrigation and Drainage Authority Act of 1997

"The Provincial Irrigation and Drainage Authority Acts were enacted in all provinces in 1997. The purpose is to introduce institutional reforms in the water sector of Pakistan. The public-sector institutions have not been able to recover even O&M costs because of inadequate assessment and collection of user charges. These Acts will initiate irrigation and drainage sector reforms to improve service delivery and sustainability. These Acts provide the legal framework for establishment of Provincial Irrigation and Drainage Authorities (PIDAs), Area Water Boards (AWBs) and Farmers Organizations (FOs)".

"These outdated laws are not fulfilling the need so, preparation of a comprehensive Water Law is needed which should complement and replace more than two dozens of existing Provincial Acts covering the subject of Water, as legislated from the Year 1873 to Year 1997. A comprehensive legislation would make the water-related laws concise and more-readily understandable and less susceptible to misinterpretations". It appears that Pakistan has rivers as well as Dams but still there is shortage of water in Pakistan. The current legislation is not comprehensive therefore there is need to legislate effectively and implementation for protection of right to water in Pakistan. The storage capacity of Pakistan may be enhanced by constructing further Dams. In this respect Pakistan has challenges as well.

Discussion

Keeping in view the analysis of laws and discussion on water management in Pakistan, the results and findings of the study are as follows:

Contemporary Challenges for access to Water in Pakistan

According to experts, "the per capita availability of water in Pakistan, currently placed at 1030 cubic meters will go well below the 1000 cubic meter mark in the next few years unless quick remedial steps are not undertaken" (The Express Tribune, 2014). The scientist of the country, which is rich land for because of its rivers and canal system and full of water they have a unanimous opinion regarding the preservation of water and safe of water by constructing the new reservoirs for storing the water as its received in "Its water which comes from rivers and rainfall Pakistan is going to be face the problem of water shortage and inadequacy and it's a serious threat resultantly country will become the water scarce country. "The experts, in the event are also warning us of accompanying unthinkable social and environmental disasters".

Strategy to meet the problem

What will be the strategy to face problem? What we want to do? Whether we sit and wait for the disaster as some English poet described in his poetry this worsening situation and give the resemblance that there will be no even a single drop of water or we unanimously as a nation by combine strategy get rid of this threat. "We must have on the firm belief that our best chance to avert the predicted ominous water crisis is in fighting together against It. The way we look at it, all four provinces and integrating units of Pakistan need to break all biases and shackles and come on the same page to find solutions that will help us save our present and future generations from this most threatening crisis. This may be an uphill task, but we can make it happen only if we understand that we are fast running out of time and our history's biggest threat is soon going to be knocking our front door. In developed countries such threats whenever encountered, it is their institutions that pave way for plausible solutions".

National Water Emergency

"If we too claim to be a progressive country, then what better forum than the Parliament to deliberate upon this most important matter on which the country's survival depends. Parliament which has representative of People of Pakistan will never shirk from taking up this alarming issue and given its importance incessantly work out ways to counter it. Such a parliament will extensively deliberate and debate on all aspects of the problem and achieve consensus on the required steps and reach solutions by means of new legislation". A truly representative parliamentarian, A real democratic parliament which form by the votes of the people can make the solution of all the problems relating to water crises by declaring an emergency in country and focus on construction on new water reservoirs by the act and through consent of the Pakistani parliament which is appropriate forum to dispose of the issue amicably and by making the new laws which address all the problems which is country currently facing and most important thing in this regard by formulation a National Water policy which is still country deprive from this and through dialogue by electronic and print media and making a campaign in the society and creating the awareness among the people of the country and students of the country whose are the most influential group of the society and amicably to come the all the provinces on the same page and all of them convince them that water is our need and we must save them for coming generation and construct new water reservoirs so that we may prevent themselves and stop the coming flood towards the people and avoid to displace millions of people every year. This is proper and appropriate way to sought out the issue amicably by the consent of all the provinces. "One look at the map of Pakistan is enough to tell us that our river system is our biggest integrator with water playing the same role as blood flowing through the veins and binding us all into a unique bond named Pakistan".

Utility of Water

"Water is vital for life. We need water not only for drinking purposes but to irrigate our lands, run our factories and to keep the ecology in balance. Besides its conventional uses, water has also proven beyond doubt as the single most important means of electricity generation in the last 150 years of human history. Although, over the years other power generation technologies which rely on alternative energy sources have also been developed but by and large hydroelectricity beats them all in terms of cost and benefits. Today, countries like China, USA and India have achieved their current enviable progress by building thousands of dams on their river systems. Their economies now rely heavily on the cheap electricity obtained from these dams to supply uninterrupted power to homes, workplaces, farms and factories. Besides power generation they also use these dams' large water reservoirs for supplying drinking water to their growing populations, for maintenance of their ground water table, preservation of their environment and last but not the least to irrigate their vast agricultural lands".

Conclusions

From the preceding discussion, it is concluded that Pakistan has certain water reservoirs and Dams but there is further needed to take necessary steps for storing water. Pakistan lacks storage capacity of water. In this respect, steps may be taken to control it. In terms of legislation related to water, Pakistan needs effective legislation and to that end implementation is inevitable. Pakistan has certain challenges, such as, lack of water reservoirs, shortage of storage capacity, preservation of environment and irrigation etc. Special efforts are needed to overcome these challenges.

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