

## IMPACT OF WATER SCARCITY ON ECONOMY AND WETLAND HABITAT WITH SPECIAL REFERENCE TO BALOCHISTAN

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### Abstract

*The world has moved on to realizing the importance of water, because scarcity of fresh water exists more or less every where in the world. With the economy largely dependent on irrigated agriculture, Pakistan's water needs for human consumption and industry are also putting ever increasing demands on the available water resources. The Balochistan province suffers from a water scarcity and the situation continues to deteriorate with each passing day, which is affecting economy as well as the biodiversity.*

*Water has a critical role in the province's economy, and in Balochistan where water has always been a scarce commodity, the constant abuse of the natural resources since the last many decades is posing a challenge to environmentalists and planners to come up with appropriate short and long term strategies that should be followed to control the situation of scarcity of water and protect its already weak and fragile environment.*

*This study was designed to ascertain a) how much water was available for the province; b) water deficiency; c) how this deficiency was affecting the economy and biodiversity of the province; and d) in the end, the suggestive measures to improve the water scarcity and to preserve the aquatic biodiversity of the province have been recommended to improve the economy of the province.*

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### Key Word:

Water scarcity, Wet land habitat, Bio diversity, Environment, Eco system

### INTRODUCTION

Water is the basis of life in the universe, especially the fresh water, which is crucial for nature, aquatic biodiversity, environment, food, security and agriculture. Water has a critical role in the economy of Balochistan, as it has a direct bearing on all sectors of economy. The already limited and scanty ground water resources of the province are also being relentlessly exploited beyond their sustainable development potential causing an alarming declining rate of water table in many natural aquifers. Another imposed by human and livestock pressures. The range lands continue to be ruthlessly degraded due to constant overgrazing and wood cutting resulting in sheet and gully erosion in the range lands. Besides, the consequent loss of top soil and natural nutrient content of

economic aspect of province is its aquatic biodiversity. Many of the unique kind of species found in Pakistan are present in Balochistan. All this biodiversity is dependent on the water. The depleted situation of water has also caused deleterious impact on aquatic biodiversity. The natural resource-based Balochistan, spatially the largest province of Pakistan, is constantly losing its potential and productivity primarily due to extreme aridity of climate in most parts and the numerous desertification processes the fertile soils the productivity / potential of the watersheds is being constantly reduced. In addition this is resulting in producing heavy run offs and floods, which are responsible for causing damage to life, property and fertile agriculture lands.

**Table 1.** Water sources for cultivated areas of Balochistan

S. No.	Water Source	Contribution (%)
1	Canals	23.95
2	Wells	0.62
3	Karezes	3.75
4	Tube wells	11.22
5	Sailaba & Khushkaba	60.46
<b>Total</b>		<b>100</b>

Balochistan is especially rich in biodiversity, given its position in the transitional zone between two of the world's major zoogeographical regions the palaearctic and the oriental species from the Ethiopian are also represented in Balochistan. The geography of the region has an impact on the distribution of plants and animals. To the west lies the great Seistan desert basin, which includes parts of Iran and Afghanistan and extends in Balochistan into districts of Chagi and Kharan. To the east lie the Thar and Cholistan deserts, to the north the Himalayas and the adjacent mountain chains, of Koh-e Hindu Kush and to the south the Arabian Sea. Biodiversity provides free of charge services worth hundreds of billions of rupees every year that are crucial to the well – being of Pakistan's society. These services include clean water, pure air, pollination, soil formation and protection, crop pest control and the provision of foods, fuel, fibers and drugs. Reduction in biodiversity (including local extinction of species) affects these ecosystems services. The sustainability of ecosystems depends to a large extent on the buffering capacity provided by having a rich and healthy diversity of genes, species and habitats. In that respect, biological diversity is like economic diversity in a city, it's essential for

long term survival and a sound investment in the future. Conservation of biodiversity also makes good environmental sense. The air we breathe, the water we drink and the soil that supports crop production are all dependent on biodiversity. The direct causes of loss of aquatic biodiversity include activities such as: Water Diversion and Drainage, Hunting and Trapping, Fishing, Pollution, and Global Climate Change; while the indirect Causes include: the unsustainably high rate of human population growth and consumption, economic system that fail to value the environment and its resources, inequity in the ownership, management and flow of benefits from both the use and conservation of biological resources, deficiencies in knowledge and its application, legal and institutional system that promote unsustainable exploitation, the steadily narrowing spectrum of traded products from agriculture, forest and fisheries. Wetlands are characterized by the presence of water dependent species of plants and animals. As an integral part of the water cycle, wetlands are amongst the most productive ecosystems on earth and are of great economic and cultural importance to mankind. Balochistan has some of the world's finest wetland habitat.

**Table 2.** Water scarcity: A threat to ecosystem.

S. #	Ecosystem	Characteristics	Significance	Threats
1	Indus delta and coastal	Extensive mangroves and mudflats. Inadequate protected area coverage.	Rich avian and marine fauna Diverse mangrove habitat Marine turtle habitat	Reduced fresh water from diversions upstream cutting mangroves for firewood drainage of coastal wetlands
2	Indus river and wetlands	Extensive wetlands	Migratory flyway of global importance Habitat for Indus river dolphin.	Water diversion / drainage agricultural intensification toxic pollutants.
3	Chagai desert	A desert of great antiquity	Many endemic and unique species.	Intensification toxic pollutants proposed mining hunting parties from the Gulf.
4	Balochistan Juniper forest	Huge and ancient Junipers	Largest remaining juniper forest in the world, unique flora and fauna.	Fire wood cutting and overgrazing, water scarcity and habitat fragmentation.
5	Chilghoza forest (Sulaiman range)	Rock outcrops with shallow mountain soils.	Important wildlife habitat, several species at risk.	Fuel wood cutting, water shortage, overgrazing illegal hunting.

6	Balochistan (Subtropical forest)	Mid – altitude forest with sparse canopy but rich associated flora.	Very few areas now remain important wildlife habitat.	Fuel wood cutting water shortage, overgrazing.
7	Balochistan rivers	Not connected with the Indus river system.	Unique aquatic fauna and flora with high levels of endemism.	Water diversion / drainage fishing.
8	Trans – Himalayan alps and plateaux	Spectacular mountain scenery	Unique flora and fauna centre of endemism.	Fuel wood cutting and overgrazing water shortage illegal hunting habitat fragmentation unregulated tourism.

Reduction in the flow of fresh water to the Indus Delta has created two problems; first, the salinity of the sea water has increased which is detrimental to mangrove growth, while the second problem is the flow of alluvium (the fine gained nutrient rich soil) brought by the rivers during their course through the fertile plains has declined. Reports show that there were eight different species of mangrove in the Indus Delta even during 1950s. At present only three species of mangrove exist in the Delta. In addition to the loss of species, there has been a consistent decline in mangrove cover in the Indus Delta, and as a result of fresh water scarcity overtime, mangrove cover has been reduced both qualitatively and quantitatively.

Water development and management policy largely depends on the socio-economic environment of any country. Rapid economic growth and social changes in Asia has resulted in intensified water use and thus water management policy has been pre-developed in many countries. As a result, various water problems arose such as destruction of water sources and ecosystems, overexploitation of ground water and ever increasing water pollution. Water management policies in Asian countries are often unsustainable or lack continuity because of their vulnerability to socio-economic changes.

This research study was so designed to cover the socio-economic sectors and aquatic biodiversity being affected by water scarcity in Balochistan and to suggest practicable measures which would have impacts on improvement of economy and better water management system for its best utilization.

## MATERIAL AND METHODS

The study area comprised of complete Balochistan. Particular areas like coastal belt, River other water bodies were considered for study of aquatic biodiversity. The departments like Water and Sanitation Authority (WASA), Agriculture, Food, Live Stock, United Nation Development Program, (UNDP), Water and Power Development Authority (WAPDA), Irrigation, Hydrogeology, Survey of Pakistan, Public Health Engineering (PHE), International Union for Conservation of Nature (IUCN), Planning and Development Department of Balochistan, Agricultural College, etc were approached for the collection of relevant data and statistics.

Besides the collection of data on economy of the province, the impacts of water scarcity on economy questionnaire was also developed to assess the water scarcity impacts by making the close liaison with the people directly involved with the above mentioned aspects and to obtain the first hand data. During the process of designing of questionnaire following four factors were taken into consideration on the basis of social ideology: i) awareness, ii) norms, iii) behavior, and iv) regulations. The questionnaire was designed to measure the overall behavior of the respondents towards the water scarcity impacts on economy and aquatic biodiversity. The questionnaire was prepared and item difficulty level, item coherence and item analysis were also kept into consideration. After having a pilot study on equal respondents, factor analysis of the items was made, minor changes and substitutions of certain items were integrated after the pilot study and the formal process of its validation. After the treatments, a final version of the questionnaire was adopted for bulk study. Since focus population was not well versed with

English Language, therefore, an Urdu version of the questionnaire was prepared by a language expert. The method of back translation was adopted, and Urdu version was retranslated by another expert to match and finalize the true essence of its objectivity. Finally the Urdu version was used in pilot as well as in bulk study. The questioner developed is given below:

1. Do you know the Impacts of water scarcity?
2. Do you think that a water scarcity phenomenon is happening in all over the world?
3. How do you gauge that water is shortening to meet the needs of agriculture, livestock, food and aquatic biodiversity. The main contributing factors to the economy of the province?
4. What aspects do you think are responsible for water scarcity?
5. Do you think every individual will suffer from water scarcity if we don't take remedial measures?
6. What is biodiversity and why it's Important?
7. Do you know that water scarcity has severe negative Impacts on Mangroves and aquatic biodiversity?
8. Do you think the Migratory birds and other species are depleting due to equate shortage of water?

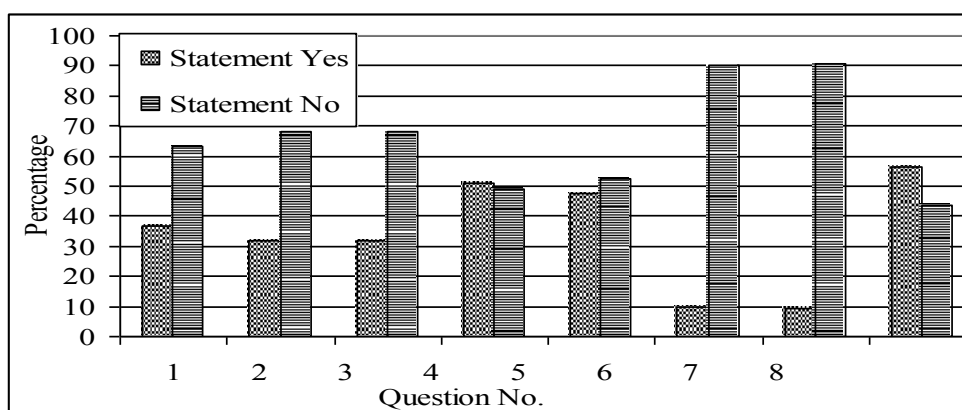
To obtain wide ranging representative view of the mass of the population, the province was

divided into agro-economic zones i.e., the main crops producing districts like Zhob, Qila Saifullah, Qila Abdullah, Chagai, and the Indus Delta belt area etc and the same procedure was adopted for the aquatic biodiversity. A random representative sample of one hundred and twenty (120) persons was collected from all above mentioned areas making an overall sample of 240.

Eight trained staff contributed in data collection, however, the researcher supervised randomly the data collection procedure personally to avoid any forged data collection. The entire questionnaire was coded (1 = yes, 2 – no) and used for the Data base in SPSS-13 for windows. Data was analyzed in SPSS keeping in view the research questions.

## RESULTS AND DISCUSSION

After having analysis of the data base established on the basis of responses required through research questionnaire are discussed as under. This depicts an overall scenario of the trend of the respondent.



**Figure 1.** Chart showing responses of 240 respondents to different questions.



The first question on the Impacts of water scarcity indicated that 152 out of 240 (63.3%) respondents were not aware with the concept of water scarcity, however 88 (36.7%) replied in positive. This means that majority of the respondents had no knowledge about the term water scarcity. The question on the water scarcity phenomenon in all over the world and on gagging the water shortage to meet the needs of agriculture, livestock, food and aquatic biodiversity which are the main contributing factors to the economy of the province, (75.8%) 182 out of 240 did not have any idea that whatever they were producing, the biodiversity had the major role in the production and consequently in the economy of the province. The response to the question if the community felt some responsibility for water scarcity, 122 out of 240 (50.8%) positively responded where 118 out of 240 (49%) showed negligence. The response to the question if they thought every individual would suffer from water scarcity if no remedial measures were taken, it was found that they had very little knowledge of water shortage at global level. The responses to the question of biodiversity and why that was important, showed that the majority of the population did not have the knowledge of aquatic biodiversity and its importance in their economy. The question regarding the severe negative impacts on mangroves and aquatic biodiversity due to the water scarcity, the result showed a poor awareness (9%) amongst the public about the depleted state of the mangroves and aquatic life, which is quite alarming because the public was not aware of the fact that it was possible to preserve and sustain aquatic biodiversity. The last question regarding depletion of migratory birds and other species due to the acute shortage of water, the results were encouraging (56%) and the possible reason could be the phenomenon of "Seeing is believing", what people see around, they speak out the same thing. The lakes, ponds and other water bodies around them were rapidly getting dry and aquatic life associated with water was on the decrease.

It is very obvious from the current state of the province that the future development of Balochistan depends on water resources expansion and management. In the absence of new water sources, management of the existing irrigation system in a better way is the only viable option to meet the challenges of future.

## CONCLUSIONS

Irrigation is central pillar on which rests the economy of the province. In the irrigation sub sector, measures are expected to be taken to increase water availability, water reliability, equity of water distribution and irrigation efficiency, to reduce water logging and salinity, to limit the over exploitation of the fresh ground water resources and to improve cost recovery. But these measures are not being taken hence the province is facing water scarcity. River flows at present are not being utilized during the flood period in Kharif. The utility of flood water is very marginal.

Province has also been blessed with unique species which are also water dependent. Improved and efficiently managed water system will definitely support the depleted state of aquatic biodiversity. There is also need that government agencies should take severe action against smuggling and over exploitation and illegal hunting of aquatic biodiversity, to save the already threatened species.

## RECOMMENDATIONS

Based on this study, it is recommended that Water Conservation Programs such as: lining of minor canals, distributaries, and water courses should be accelerated, the modern irrigation application techniques (trickle, sprinkler etc), that have potential to improve water distribution and water use efficiencies, should be introduced in the areas with water scarcity, ensure efficient utilization of groundwater, development of a water Resources Master Plan for the for conservation, storage, watershed management and water resources development is required. It is also recommended that: compliance with existing laws, regulations and ethical codes be ensured, promote behavioral change by increasing awareness and capacity, develop, maintain and exchange knowledge and information, participatory catchment's management and conservation how to do it best?, develop an effective legal framework for the implementation of the conservation of biodiversity (CBD) and related conventions, enhance the enforcement of biodiversity-related laws, expand and improve the information, based on the biodiversity, develop a comprehensive strategy for public education and awareness, develop and institutionalize systems to monitor key elements of biodiversity.

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