Water as Blue Economy for Sustainable Growth in Pakistan

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Abstract: Water as Blue economy is a viable and prudent use of oceans and other water resources for the economic development of a country. Pakistan's blue economic growth is heavily dependent on; aquatic life, agriculture, biotechnology, energy, health and recreational sector. The paper focuses the relationship of blue economy, i.e. water resources of Pakistan with respect to the several sectors and to investigate water as an economic commodity and highlighting the limiting factors which directly or indirectly affecting the blue economic development of the country thus suggesting the possible solution to overcome the barriers. The secondary data from 1992-2015 has been taken for the analysis of generation of blue capital in Pakistan. The contributing factors impeding the blue economy are; over-exploitation of oceanic resources, deterioration of water quality, lack of awareness and research activities for utilization of marine resources efficiently, bungling of water consumption practice in agriculture, dearth of consistent water ruling system, dilapidation of coastal ecosystem due to human activities, absence of infrastructure and technological advancement for energy production from stored or waste water, and lack of asset for the exploration of useful drugs and by-products from water sediment and in offshore energy production sector. The effective management and governance of available resources, especially for; Irrigation practices, political stability, effective policy framework, tangible investments in water-energy and technological sectors, accessibility of blue resources to the poor and under privilege community and efficient presiding system for the diminution of the synchronization gap between all controlling, monitoring and evaluation are required for viable blue economic development in Pakistan.

Keywords: Blue economy, GDP, Growth, Water Resources, Sustainable.

1. INTRODUCTION

Blue Economy: The notion of Blue Economy identifies the water bodies as main drivers of the economic progress with great impending for novelty and growth [1]. This idea initially proposed by pacific small island developing states during the Rio+20 introductory stage [2]. As a blue planet 71%, which is 510 million km^2 of the earth's surface is covered by marine water and the average depth of oceanic bodies is 4 times the average altitude of the land [1]. Coastline of Pakistan is 1,050 km long and in the ranking of coastline length, Pakistan is at 74^{th} in the list of top most 142 coastal states. In terms of land to cost ratio (1:36) coast is 36 times more than land in Pakistan. Recently 50,000 sq. km of the continental shelf has been added to the existing 240,000 sq. Km of Exclusive Economic Zone (EEZ) under Pakistan's authority [3].

Pakistan's Indus basin irrigation system consist of 3 main water reservoirs, 16 dams, 2 head-works, 2 drains off crosswise of major rivers, 12 canals used for inter river linking system, 44 canal network and 107,000 water pathways. The total length of canals is around 56,073 km. Irrigation system also utilizes over 41.6 MAF of ground water [4]. Indus Basin Irrigation System (IBIS) and ground water play a vital role in the progression of the agricultural economy of Pakistan. In Pakistan 94% of surface water is used for irrigation as well as 45% from groundwater. Agriculture comprises 21% of GDP and 54% of the entire employment is delivered by agriculture and it brings about 70 % of our total foreign exchange earnings. The economic contribution of fisheries is manifold not only does it generate income through sales of fish; it also creates employment whilst recreational fisheries contribute to tourism. It is a source of subsistence for many communities along the coastal areas. They also serve medicinal purposes such as the production of cod oil. Global GDP of US$ 270 billion is derived from marine captured fisheries and nearly 260 million people depend on ocean related sector for their livelihood [5]. In Pakistan fish and seafood industry have economic wealth of $1.2 billion [6]. According to the Food and Agriculture Organization (FAO), aquaculture is the farming and harvesting of all the aquatic organisms to obtain financial benefit of export and by generation of job. Furthermore 50,000 people and more than half of the labour force in the littoral areas of Sindh and Baluchistan provinces completely rely on fisheries sector [7].

The international trading, transportation by sea route is efficient and inexpensive mode. Globally 92% of trade are carried out by oceanic vessels, of which 60% of national freight are handled. From Pakistan's perspective as 95% of all products trade and 100% of

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oil/coal imports are elated via the sea course [8]. It has high potential for growing Pakistan's economy and led to the establishment of shipping industries, exploitation of offshore resources as well as increased GDP through freight and insurance charges. Hydroelectricity is an easily accessible, cheap, renewable and economically feasible source of energy. Due to increase in population worldwide, demand for more energy production is also going to increase, globally from hydro power resources 19% of energy demand is fulfilled by the production of hydroelectricity. Hydropower potential in Pakistan is 100,00MW and the total installed capacity of hydropower projects is about 6750MW (11.25%). For the extraction of oil and gas reservoirs at offshore sites by advanced high profile deep drilling machineries produce lower costing fuel for industries as well as create jobs. Globally 28% of overall gas production resulting from offshore and the trends are increasing [9]. Pakistan has 6 offshore basins and 2 foot belts, from which Indus and Makran basins have large amount of oil and gas reserves. Bay of Bengal is one of the largest delta/fan systems of the world.

Mangroves have significant importance as a source of fodder and fuel for the local communities along with mariculture (cultivation of fish or other marine life for food) which ultimately generate foreign exchange earnings of about US$100 million in each year in Pakistan. Furthermore livelihood of more than 100,000 people which are interlinked with fishing industry is ascertained by mangroves forests.

Coastal or water based tourism have several related activities which promoted blue economic development directly and indirectly [10,11]. Economically tourism generates a billion of dollars and more than 200 million people get employment in the whole world and this sector.

1.1. Problem Statement of the Study

Blue economy is vital in context with national growth of the country but the challenge is how the sustainable economic and environmental stability can be achieved on the face of current prevailing anthropogenic activities in the blue gold industry in Pakistan.

1.2. Objectives of the Study

1. To analyse the status of blue economy with reference to the prevailing situation of over exploitation of water resources in Pakistan.
2. To evaluate the viability of water resources in the context of its productivity in Pakistan.
3. To highlight all the limiting factors which directly or indirectly act as hurdles in the way of blue economic development in Pakistan.
4. To suggest a possible solution to overcome all limiting factors in the way of blue economic development.

2. LITERATURE REVIEW

Blue economy is not just limited to pacific SIDS, this idea is also spreading in the whole world and 8 coastal stated of South African development community (SADC) are interested to manipulate this innovative idea in their country economic strategy [12]. Rio+20 outcome is one of the greatest effort for the implementation of all obligation for the conservation and restoration of aquatic resources in the framework of post 2015 SDG [13].

In Iran, around the central desert region, 1096 jobs can be created by proper and systematized water resources management, which will be an improvement of almost 13% as compared to previous trends [14]. In Lombok, A new blue economic development program is predicted to engage 77,700 people and profit generation is US$114.88 million per year [15]. With 130$ billion GDP Bangladesh is at 44th number in the highest economy ranking it's all major economic profits are derived from seawater, continental shelf of Bangladesh is spread over 118,000 sq.km of area [16]. In Mauritius first ocean economy roadmap was launched in 2013 and the purpose of roadmap was to utilize untapped living and nonliving resources at their exclusive economic zone [17]. In Norway value addition in the total national budget through marine area is 20% of the total national budget. The value of production in 2014 from Marine Areas in Norway was around 20 per cent of the total national budget [18].

FAO of UN emphasized that a globally 32% of fish stock are over exploited and only 50 % are fully consumed [19]. Over the past 2 decade, Aquaculture production shows upward trend of growth at the rate of 6.1% yearly. In Asia – pacific region 90% of global production of aquaculture is taking place. In Norway, highest supply of aquaculture is accomplished e.g. 1 million metric tons, which is 1 quarter of global supply [20]. According to national marine fisheries services, monetary value of U.S. Fisheries, which is protected by

a coral reef is over $100million [21]. Economic and ecological value generate from coral reefs are; natural hazards controlling up to US$189,000/hectares/year, leisure industry up to US$1 million/hectare/year, genetic supplies and biotechnology up to US $57,000/hectare/year and fisheries up to US $3,818/hectare/year [22].

Canadian's economy is depends on water resources, 75% of Canadian oil and gas production occur in Alberta, which only relied on the 7% of Alberta's water, while agriculture consumed 60-65% of water . In addition of this oil sand's production is expected to increase by 50% by 2013 [23]. Fiscal deal of $ 1 billion in the development of infrastructure in water deficit region is finalized that would create jobs between 11,500 and 47,000.further pecuniary contract can increase employment value from 15,000 to 22,000 new jobs. In Canada " blue screen" (building Canada plan) in which suitability standards was water efficiency plan and programme for the funding of large scale water/ waste water project. In United States, calculated value of water efficiency alliance is $10 billion revenue. This initiative would uplift GDP by $13 to $15 billion and generates 150,000 to 220,000 jobs in different economic sectors [24]. According to the study by the organization for economic cooperation and development, global oceanic economic value is around US$1.5 trillion per anum, that make 2-3%of world's GDP and employed 350 million people as well [25]. National report of Australia in 2015 assure that marine sector is contributing to the economic development of Australia with the rate of 3 times faster in the next/coming decade: A$47.2 billion in a year to about A$ 100 billion in 2025.

In china ocean- related sector contribute more than 41.5 % of total country's employment [26]. In Michigan, an annual report made by the sea grant officials, warehousing, shipping freight and commercial traffic are generating more than 65,ooo job and $ 3.3 billion revenue annually. In addition of this commercial value of tribal fishing operation is $10 to 12 million in each year. According to Anderson economic group water dependent sector of Michigan are agriculture, manufacturing and mining employing 581, 000 people. This putting Michigan on 8th number in the ranking of world top most blue economic development countries [27]. Scottish Executive's Marine Energy Group determined that in the Scotland maritime energy sector will be sufficient for 10% of electricity production and 70000 direct employment sources [28]. Worldwide in 2014, 3900 TWH of hydroelectricity generated, an upsurge of more than 3% from 2013 [29]. In the ranking of big contributor of world's hydropower energy production, Brazil is on the top, account of about 91% of total production, after Brazil, Canada, China, Russia and the U.S. have large hydropower resources and these 5 countries harvest more than half of the world's hydropower production. The estimated cost per kilowatt hour of hydroelectric power is RS.1.5 as compared to 12.25,16, 14, 22 rupees for coal based, oil based, wind and solar electricity source respectively [30]. In 2010 US president Barack Obama formulate approved national ocean policy, for the smooth jurisdiction and interests for new blue economic paradigm in coastal states. Rhode Island's ocean planning process is one of the pivotal platform for the construction of United States' first commercial wind project at offshore sites. This offshore site requires $290 million investment to generate 300 new jobs and 30 megawatt of clean energy produce by it [31].

3. METHODOLOGY

Broad literature reviews and data related to the economic potential and its utilization in various sectors of water was carried out to achieve the objective of this paper. Pakistan being a developing country has the data - limitation, situation in blue economic sector. Thus, the data needed for this paper was collected from concerned institutions and various related publications. About 57 research process is incipient and implemented a form of 'relative tracing' and through different intermediaries, tracing in relative factor in each blue economic sector are analysed by comparative analysis between past and present scenario. Most of the data on water as blue economic commodity of Pakistan were derived from secondary sources such as the World Bank (Pakistan), FAO of UN, WAPDA, National oceanic administration authority (Pakistan), Asian development bank, etc. Reports and publication or journal related to water as blue economy for the achievement of sustainable growth in Pakistan was also consulted.

4. DATA ANALYSIS OF BLUE ECONOMY IN PAKISTAN

In Pakistan pattern of precipitation is not uniform in the whole country. As a most arid country of the world, annually less than 250mm rainfall is observed in 75% of Pakistan, while 20% of it receives only less than 125mm annually. From freshwater resources - snow and glaciers, annually 154.88 MAF of water delivered to the Indus river system (IRS). About 68 %(104.73 MAF) of Indus river system supply is utilized by

irrigation purpose, while from rest of supply 25.5 % (39.4 MAF) is directed towards the sea, approximately 6.5 % (9.9MAF) is not consumed; only tumble during floods, evaporate, and seep down in the earth.

Table 1: Annual Fresh Water Withdrawal (Billion Cubic Meter)

1992	155.6
2002	172.6
2012-2015	183.5

Source: world data bank.

In Pakistan annual freshwater withdrawal was 155.6 billion cubic meters in 1992 and has increased to 183.5 billion cubic meter after 23 years till 2015. Ground water produced internally was 55 billion cubic meters per year in 2014 which has not changed since the last 10 to 15 years. A visible picture of water scarcity can be seen by ascertaining the fact that in Pakistan water availability at a per capita level showing a downward trend from 5,600 cubic meters at the time of independence in 1947 to 1,017 cubic meters in 2015 and if current conditions prevailed in future water availability will be further decreased.

Table 2: Renewable Internal Freshwater Resources Per Capita (Cubic Meters)

1992	484.086
2002	381.2254
2012	310.0474
2014	297.2261

Source: world data bank.

In Pakistan Per capita Renewable internal freshwater resources show decline condition from 484.086 cubic meters in 1992 to 297.2261 cubic meters in 2014, giving an estimated average increase of 37.32cubic meters from 1992 to date. Pakistan sea bed region outspread to 50,000 sq.km and the country can exploit all types of biotic and abiotic resources of the sea up to 290,000 sq. km in 2015. The reasons behind the paucity of fresh water resources are climate change and variability, population growth, increasing water demand, overexploitation of water resources and environmental degradation.

Table 3: Water Productivity, Total (Constant 2005 US$ GDP Per Cubic Meter of Total Freshwater Withdrawal)

1992	0.424081
2002	0.523441
2012	0.75065
2014	0.820554

Source: world data bank.

Water productivity as of per cubic meter of total fresh water withdrawal was 0.82 US$ GDP in 2014 which previously was 0.424 US$ GDP in 1992 showing an average increase of 0.132 US$ GDP. The value of water productivity is increasing, but freshwater resources are not remained enough to fulfil the demand of water use in the coming decade.

Current water supply is not sufficient for all populations in Pakistan and it has been estimated that by 2025 in the face of growing population 191 MAF water supply will not be enough, against 274 MAF water demand. There are many reasons behind this existed gap of 81MAF between supply and demand of water including poor irrigational practices in agriculture, inadequate infrastructure, rapidly increasing population growth, degradation of water quality and policy limitations at regional and national level in Pakistan. Moreover, total water storage capacity of Pakistan is 114 MAF, while the annual water requirement is 117 MAF. Insufficient water storing reservoirs, unproductive water use in different water dependent sectors are the basic reason of water wastage in Pakistan. In the report of the UN on the world water development, it is mentioned that during the period of flooding from 2010 to 2012 about 3,072 lives and monetary value of around US$16 billion were lost in Pakistan. In every year, more than 250,000 children under the age of five perish from water borne diseases which ultimately produce economic burden of $1.3 billion on Pakistan's economy.

Health impacts of flood is a big hurdle in the way of economic progress in Pakistan, according to United Nations Organization, in 2010 almost 763.5 million children were most vulnerable to water born disease and annually national income losses of US$ 380 to 830 million of the GDP are estimated due to water and hygiene related diseases in Pakistan. For the treatment of water born and hygiene related diseases Rs 300 million are spent that produce financial weight of Rs. 112 billion per year on the national economy. Blue economy in the relation to the health sector in Pakistan is not progressing, because assessment of point and non-point sources of water pollution is not being properly conducted in Pakistan, which is producing stress on the pecuniary expansion structure.

4.1. Agriculture and Blue Economy

Agricultural irrigation system in Pakistan is relying on the accessibility of Indus basin and ground water supply. The Indus basin irrigation system is spread

over 944,573 sq. km with 40,000 miles of water distribution channels and 4380 miles of linkage canal system.

Agriculture value added 2.7% of annual growth in 2014, which was 9.5% in 1992 showing a downward inclination.

Table 4: Agriculture, Value Added (Annual % Growth)

1992	9.501318
1997	0.123629
2002	0.103376
2007	3.423502
2012	3.622132
2014	2.691719

Source: world data bank.

In Pakistan approximately 44% people are employed in the agriculture sector in 2014 compared to 48% in 1992 showing a decline in the production of the economy in the form of employment. Production loss due to water logging and salinity amounted to around Rs. 88 billion per annum.

Table 5: Annual Fresh Water Withdrawals, Agriculture (% of Total Freshwater Withdrawal)

1992	96.79
2002	94.26
2012-2014	93.95

Source: world data bank.

In Pakistan annual freshwater withdrawal for agriculture sector is 94% of total freshwater withdrawal in 2014 as compared to 97% in 1992. In Pakistan from annual river flow 140 MAF (74% of total flow) are directed to the canal system for irrigation, while rest of river water (19%) undergoes in the Arabian Sea, which generate the losses (7%) of the river system. In the case of canal irrigation system, water utilization efficiency is, only 47%, because of infrastructure damage and inefficient water courses 55 MAF (53%) of water is lost while passing across the system. The financial value of (53%) of water loss is around Rs. 3.3 billion per annum based on “Abiana” rates of Rs. 60 per acre-foot of water (IBIS). The canal irrigation system is not according to standard of water distribution system. For assessment and valuation of surface water used in the agriculture Abiana collection (flat water rates) is Rs 1,877 per acre foot, for Rabi season (spring crops) it is Rs 3,380/AF and for Kharif i.e. autumn crops it is Rs 949/AF. Status of Abiana collection in Pakistan revealed that collection is 15 to 20 times lower than the operation and maintenance cost of canal and ground water discharge outlets used in any vicinity of a country.

Due to the scarcity of fresh water resources, area irrigated by ground water resources has increased from 2.7million to 3.4million hectares while area irrigated by surface water has decreased from 7.9 million to 6.9 million. On more than 70% of productive irrigated land, conjunctive use of ground and surface water are utilized. Poor water utilization pattern in agriculture sector is producing Financial constrain in Pakistan. This unusual trend of annual growth rate and inefficient water utilization in agriculture sector can be attributed to; lack of infrastructure, poor water management strategies, water logging & salinity, wastage of water in the canal system, incompetent use of freshwater and groundwater resources, lack of consistent water policies and surveillance system for water usage at agricultural farmlands and ineffective Abiana collection system in Pakistan.

4.2. Fisheries, Aquaculture and Blue Economy

Fish consumption in Pakistan is relatively less with only two kg per year compared world average of 17 kg per year. Annually 600,000 metric tons of fish production are harvested in Pakistan. Out of total catches 71% are exported annually. In Baluchistan it was found that there has been an increase in fish, shrimp, lobster and cuttle fish processing plants from 10 to 39 since last three years. Trawlers use nets catching fish in deep-sea and from entire lot, only 10% of, the catch is kept for processing and commercial use, while 90% of the dead fish are waste back into the sea.

Table 6: Total Fisheries Production (Metric Tons)

2005	515472
2006	6 11247
2007	5 70148
2008	5 86512
2009-2014	584461
2015	584461

Source: world data bank.

In 2006 fish production was very high at 611,247 metric tons, but from 2009 to 2015, it remained the same at 584461 metric tons. Fisheries share of GDP is only 1% whilst employment which was top in 1997 with 416,405 fishermen have employment has begun to fall.

There are 15,000 families in Pakistan dependent on 12,000 fish processing units/farms for their livelihood and wellbeing. According to demand and the export value of fisheries, it is calculated that this industry contribute about 1% of Pakistan's GDP.

Table 7: Fish Export Earning From Pakistan

Years	Items	
	quantity million tone	Value Million US$
2005-2006	0.105	198
2006-2007	0.124	188
2007-2008	0.135	213
2008-2009	0.138	240
2009- 2010	0.21	260

Source: United Nation Industrial Development Organization, 2010.

In Pakistan fish export earnings increased from 198 million US$ in 2005 to 260 million US$ in 2010. According to Trade Development Authority of Pakistan (TDAP) in 2007 fish and fish preparations were among the top 16 export items and second among primary commodity category exports after rice, even Pakistan's water bodies have a fishing potential of up to 1.0 million tonnes per annum from marine sources alone.

Obstacles in the way of economic development of fisheries sector are lack of cold storage facilities, poor hygienic condition of warehouses of fishes, inadequate communication links, overfishing, pollution and environmental degradation. In Pakistan international regulation and standards about fish marketing, handling, transporting, processing, storing and sales procedure at domestic and inter provincial level is not implemented. Nonexistence of legal database of annual fish entry and catch is not monitored and lack of enforcement of scientific advice in Pakistan has demolished fish industry.

Table 8: Aquaculture Production in Metric Tons

2002	66970
2003	73047
2004	76653
2005-2014	80621.97

Source: world data bank.

Aquaculture (farming and harvesting of all aquatic organisms) production showed upward trend from 2002 to 2005, but thereafter its value of production remained constant. Although aquaculture has been growing in Pakistan, an in-depth analysis clearly indicates that it utilizes only around 1% of the available water resources. Pakistan's operational authorities are not giving attention on aquaculture industry. The slow or constant socio- economic growth in the last 10 years in the coastal area causing poverty trap mainly due to; low investment, fragile market and enterprises, ineffective logistic & export system and non-functioning of authorities to beat the economic potential of lucrative domestic and international market.

4.3. Export by Sea and Blue Economy

In Pakistan trade by sea route contribute about 66.5 billion dollars to economic growth, which is 31% of Pakistan GDP (khan, 2013) Pakistan National Shipping Corporation handled almost 99% import of gasoline products. The United Nations Commission on Trade and Development (UNCTAD), declared that national carriers must carry the 40% of total maritime trade. The shipping sector only covers about 20 vessels which can carry 7% of Pakistan's cargo while the remaining is handled by foreign exchange companies, which produced foreign exchange drain of about $1.5 billion annually. The annual maritime bill for foreign shipping organization was estimated to be around $1.3 billion in 2002, which is an important constrain on country's foreign reserves considering the size of Pakistan economy. In trade and revenue generation Gwadar port plays a significant role. Because of its supreme location, it is finally confirmed as duty free port and all the economy generated activities are allowed there. The sea port produces revenue and economy by Export of minerals, energy product transportation, shipping industry, tourism, fishing industry beach industry and by port related facility. Construction of a deep sea ports at Gwadar have significant importance, because it will conduct transit and transshipment trade over 20 other countries and other gulf states which has 63% of world oil reserves.

Table 9: Seafood Export from Pakistan (US$)

Year	Value (US$00 0)
2005	212, 05 2
2006	295,739
2007	217,767
2008	193,708
2009	159,878
2010	142,022
2011	92,921
2012	160,245
2013	161,458
2014	210,370
2015	161,633

National Marine Fisheries Service Fisheries Statistics and Economics Division.

Seafood export decreased from 210,370 US$ in 2014 to 161,633 US$ in 2015. From 2005 to 2015 frequently changing trend of sea food export. Pakistan's seafood industry has enormous potential of revenue generation of more than $1.2 billion. Reasons of this infrequent export value is the lack of shipping management, lack of investment in the shipping industry, monitoring and reconnaissance system of registered ships are not conducting and shipping industry is not working according to international standards. Seafood processing units are not utilizing their full capacity. Deficient trade facilitation reforms and mechanisms, absence of financing facilities, issue of growing working capital requirement and increased default payment are decreasing trade sector's efficiency. Public private partnership is not present. Different dis-integrated department are not well coordinated, lack of capability of ports to handle big amount of cargo and port is not fully equipped with advanced and upgraded technologies.

4.4. Hydropower and Blue Economy

Pakistan had been losing water for the last 40 years that ultimately become a devastating flood by which great economic loss occur in the form of destruction of infrastructure, damage of life and ultimately the whole country's economy get suffered. According to Indus River System Authority (IRSA), each year Pakistan is losing 30 MAF of water to sea, owing to inability to construct more dams, which produced drain of about $18 billion on Pakistan economy. Hydroelectricity is the cheapest, easily accessible and pollution free form of energy. Water storing reservoir has 100 years of life Hydropower potential in Pakistan is 100,000 MW, identified project are of 65,000 MW and only 6,919 MW of total energy potential are exploited. Pakistan's Indus river network system have 60 to 70 thousand megawatts potential of electricity generation: around, this production is three times more than Pakistan's electricity requirement. Energy production from Tarbela hydropower station decreased from 16006.6 M.KWH in 2010 to 15180.8 M.KWH in 2015.From Mangla hydropower station energy production show upward trend from188324. 12 M.KWH in 2010 to 209820.25 M.KWH in 2015 Likewise from Ghazi Barotha hydropower, 7434.79 M.KWH energy was generated in 2010 whereas in 2015 it is 4947.92 M.KWH from this station. In the next 15 years 50,000MW should be added to the development of the blue economy. Moreover per unit cost of hydroelectric power is Rs 1.5.this cost is very low as compared to the costs of other sources of energy production. Many small and large hydroelectric power projects are under construction in Pakistan, e.g. Bhasha (4500MW, $12.6 billion), Dasu (4320MW, 5.28$billion), Bunji (71, 00MW, 7$billion) and Akhori (600MW, 1.6billion estimated). In addition to this many runs- of-river-hydropower projects are under construction, which include the Neelum-Jhelum hydroelectric project of $32million which has installed capacity of 969MW. Different other small scale project includes Chashma project (184MW), Rasul project (22MW), Malakand (20MW) and Dargai (20MW). The delay in construction of Kalabagh dam (3600MW) causing economic strain of Rs 132billion annually. Over 3$ billion of economic losses are accomplished by the delay of one year in Bhasha dam. Pakistan's authorities have also failed to construct the Munda Dam on the river Kabul. In KPK provincial government is also taking an initiative on a Ranolia hydropower project. Punjab government is also taking a step towards the production of 1,700 gigawatt-hours of power through the hydropower project built on canal water used in irrigation system with a cost of $510 million, this project can deal with 600,000 new connections and facilitate 4.8 million people. Various challenges faced by hydro energy production sector; such as low political will, low investment, limited institutional capacity, misconceived projects, high consumption patterns, deteriorating reservoir's capacity, sedimentation, and mistrust between provinces and across boarders for water allocation, low participation of the private sector & other stakeholders and comprehensive policy framework is pre- requisite for effective and efficient utilization of Hydro-energy. Furthermore Climate changes and extreme weather conditions are one of the biggest contributing factor in the achievement of hydro power potential in Pakistan,

4.5. Offshore Oil and Gas and Blue Economy

There are various offshore fan / delta fold belts in Pakistan e.g.; Kohat-Potwar Basin. Punjab Platform Basin, Lower Indus / Middle Indus Basin, Kirthar Fold belt, Suleiman Fold belt, Baluchistan Basin, Indus Offshore Basin, Makran Offshore Basin. Offshore-under explored region is spreading over 300, 000 sq. kms. Study revealed that Indus and Makran are 2 main offshore basins and 6 onshore basins are also discovered in Pakistan (Ministry of Petroleum & Natural Resources). Total drainage area of Indus basin is 966 80,000 sq. kms. In the world ranking of the largest offshore basins Indus basin comes on 2nd number after the Bay of Bengal, an amount of 800 MMBbl oil and 5 Tcf gas can be grasped by this basin. In Makran basin exploration activities are not systematized, although in

1956 this basin was coming across some drilling with high pressure puncturing. According to US -EIA in Pakistan 105 Tcf of recoverable shale oil, gas reserves is spotted, While 9 billion barrels of shale oil reserves is present in Pakistan (Ministry of Petroleum & Natural Resources). Pakistan petroleum limited has several acreages, where initial findings indicate good Shale Gas potential in Pakistan's Lower and Middle Indus basins - Kotri, Kotri North, Gam bat South, Hala etc. In Pakistan till September 2013, by total 850(834 onshore and 16 offshore) exploratory wells are found in which 5271 oil and gas fields (62 oil and 209 gas and gas/ condensate) are discovered. Pakistan has high potential of offshore oil and gas reserve in different basin, but they are not yet explored. Different companies are involved in the exploration of offshore oil and gas reserves in different water sedimentary basins, but because of less investment by government and private sectors significant exploration is not achieved as it requires expensive and heavy machinery for deep drilling in the basin.

4.6. Mangroves and Blue Economy

The Pakistan mangrove area is a sixth largest in the world. Mangroves are present in the area of 71,132,000 hectares in which 71129,000 hectares are occupied by Indus delta region and remaining 3,000 hectares are in Kalmat, Miani Hor, and Khor and Gwadar bay. Mangroves provide a breeding site for many commercial fishes. At the coastal site of Sindh province, annual export earnings of mangroves are US$ 4 billion. In term of the economic value of mangrove forest it enhances and sustains the stability of fisheries product, other mangroves dependent aquatic organisms also have export potential and also consumed for nutritional, herbal products and medicinal purpose which have high market value in Pakistan. Each family uses 173 kg of mangrove wood per month, giving a total annual exploitation of 18,000 tons annually The annual value of about $20 million and the domestic value of $70 million generate from mangrove dependent fish species and shrimp industry. Miani Hor is a marshy pond, located at the coastal site of Lasbela district in Baluchistan, in term of the monetary value of mangroves in Miani Hor area 1,287US$ is generated. Currently mangrove ecosystem is at verge of destruction, majors reason of mangrove's obliteration are unruly consumption of aquatic resources, pressure of human's anthropogenic activities, paucity of water resources as water of Indus river is mostly used for irrigation purpose, increase in urban growth at coastal area, salinity, lack of awareness and education among coastal communities, contamination comes from nearby industry, variation in the water flow at irrigational upstream, exploitation of tree for the use as firewood, building material, fodder for grazing herbivores. Thus, a complete and detailed assessment of all limiting factors is required, which are responsible for the deterioration of mangrove ecosystems.

4.7. Tourism and Blue Economy

In Pakistan Baluchistan and Sindh provinces have widespread coastal area. Coastal sites have significant importance for the tourism because it encourage tourist to spend their holidays at resorts with various amusement activities i.e. water sports, sport fishing and boating. The rocky beaches offer sites for jetties, marinas, and sport fishing and sun bathing. The entire coastal zone can be a site of Ecotourism. The rare mangrove area is an opportunity of Ecotourism for bird watchers. Likewise, some of the archaeological sites which are high profile sites (HPA), such as Ratookot, June Bunder Fort, and Chander Gupt Volcano, etc. are not being maintained. Approximately an area of 30,000 hectares in Pakistan is corresponding to the sport fishing facility, which in turn can increase economic development in Pakistan In the year 2010, tourism sector exhibit tremendous growth, 1 million tourists arrived through numerous stations in Pakistan gave 305.9 US$ million.

In Pakistan 19 sites are declared as Ramsar sites are provided tourism opportunities in Pakistan, such as Lake Saif-UL- Muluk (Naran, Pakistan) is one of the tourist site. In Pakistan Eco-tourism opportunities are not utilized in accordance with its capacity, because of; ecological sites are not commissioned, archaeological sites are poorly maintained, deprived physical logistic structure system, low level of investment, limited participation of private sector, security issues, and non-availability of waste management system which all leads to depict a decline trend in terms of economic value.

5. CONCLUSION

The study focuses on the consequences of dominant untenable activities that ultimately effect the growth status of blue economic structure in Pakistan. It has been exerted that Pakistan's whole economic growth is entirely influenced by water resources. With the passage of time per capita water availability is going to decrease and the population is growing speedily. Squandered water produces massive

encumbrance in the economic way of progression in the form of devastating floods well as its productive utilization. Due to the paucity of freshwater resources, groundwater extraction is going to upsurge which will further create over-exploitation and depletion of the precious resources at the cost of imbalance. Devalued Infrastructure and inefficient canal irrigation system cause enough amount of water wastage. Water pricing structure is irrational. The available and extractable water resources and not managed effectively and irrigational water management is not carried out through water efficient systems thus producing enough stress on the sustainable blue structural strategy of Pakistan.

Fisheries and aquaculture sector are not following international codes of conduct and framework. Smuggling and illegitimate catches of aquatic organisms are producing a dwindling effect on trade value, additionally, local market value also affected rigorously. Water pollution is creating adverse effect on the flora and fauna of aquatic bodies. The unhygienic and slapdash condition of warehouses degenerates the quality and quantity of final product. These all factors eventually slow down the blue fiscal evolution in Pakistan.

Over exploitation of mangrove forests are continuously sinking Pakistan's economic productivity which ultimately effect the blue revenue generation status of Pakistan. Trade via water routes is also facing the problem of reduced productivity criteria including; regular certified registration, upgrading and the lack of monitoring of national crafts and national carriers. Moreover lack of financial investment and limited capacity of the respective organizations with respect to exploration and mapping of energy reservoirs in a deep benthic zone of water bodies are critical challenges leading to non-utilization of untapped resources. In Hydropower sector the potential is not exploited, slow construction of the projects, low institutional capabilities and the trust-deficit between provinces on water resources development and their water rights are some of the barriers in the way of hydropower development in the country causing suffering of blue economy. Further due to non-availability of a comprehensive tourism framework creating obstacles to observe eco-friendly tourism opportunities and economic profits also declining.

The detrimental and beneficial factors in context with blue economy includes; water availability, water quality, aquatic life, water infrastructure system, financial investments, regulatory frameworks, hydro energy, recreational activities and institutional capacity: which are the key aspects to create an impact on the community and their livelihood. The poor and underprivileged communities are not benefiting in water cycles due to inequitable allocation of water resources. Overexploitation of aquatic resources causes disruption in the water resources cycles as poor and under-privilege territories are not facilitated through blue gold. This water poverty create an imbalance and produces economic disparity, which can be addressed through the judicious and equitable distribution of the blue gold effectively and efficiently.

6. RECOMMENDATION

Pakistan is rich in diverse blue commercial resources. Pakistan's whole economy directly or indirectly relies on the output of industries for which water is a critical input, therefore for the achievement of targeted potential of blue economic progress, a comprehensive strategic framework has to be developed and implemented effectively and efficiently with political will under a consensus oriented water policy framework. Primarily for the conservation of available water resources especially at water scares region, rainwater harvesting technology must be installed. Fourth national flood protection plan (2015-2025) should be implemented efficiently. Discharge rating system for flow control structures will be helpful for efficient water utilization in agriculture. In micro irrigation system Précised GPS- based software must be used by the decision maker and local analyst. Expansion of market for tradeable water and property rights are essential for the diversification of water pricing system in Pakistan. For the high production of blue capital from fisheries industry, training of fisherman and workers of seafood processing units and building the institutional capacity in accordance with standard operating procedures is mandatory. Traceability of processed seafood products by the provision of compatible traceability device will decrease the probability of fish or other product's smuggling.

In aquaculture sector, technical assistance, continuous expansion, capacity building, value addition should be ensure. Additionally, target–oriented growth project has to be developed in the aquaculture industry. Installation of water pollution control equipment in every energy rich and potable water medium is necessary. Stringent regulation and penalties are required to be imposed on the illegal purchase of corals, minerals, and other beneficial products. During

the project development, operational, technical and governance related issues should be mitigated on urgent basis. Indus river system authorities absolutely have enough capacity to resolve the conflict of water rights and construction of hydropower system. Mapping and exploration data regarding oil and gas reservoirs bases should be generated at offshore sites. Engagement of skilled manpower as nautical engineers has vibrant significance for the stability of trade via sea routes. Financial investment transition policies and group benefit sharing system, in the ancillary shipping industry is needed for revenue generation in trade zone of Pakistan. Preferment of the ecotourism and the commissioning of high-profile areas at commercially importance tourism sites must be addressed. Furthermore, there is a definite need for accurate identification of root causes of all dominant contradictory issues and their immediate possible mitigation measures as well.

Finally the study also recommends that many other important drivers in every sector of blue pecuniary growth are the abolition of poverty, youth and women empowerment and infrastructure improvement in Pakistan. There is a need of devising of strategic policy planning framework of blue economic resources and their equitable utilization at: national, provincial and local level.

Maritime and national water policy should be developed considering the blue economic factors and a roadmap including short, medium and long term plans must be pursued for the effective execution of policy objectives. Moreover a dynamic institutional based monitoring and evaluation system must be chalked out. Institutional capacity should be enhanced to undertake the blue economy initiatives by the well- structured coordination system. Awareness, participation and coordination of stakeholders for decision making can be accompanied by the education, conferences and training workshops. If all of the above mention improvements are guaranteed, blue financial stability will definitely be achieved.

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