

**GIS Based Mapping of the Dams of  
Khyber Pakhtunkhwa (KPK) and Federally Administered Tribal Areas  
(FATA) For Promoting Fish Culture in Pakistan**

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**INTRODUCTION**

Dam construction is not new work ;even the ancient geographical distribution of Dams and reservoirs. The people have been built dams since thousands of years for grand have 6862 records of dams and reservoirs, but this various purposes such as, drinking water, irrigation, database contains only large dams and reservoirs records. floods control as well as for electricity generation purposes. Over the last six decades, about half of the World Rivers contain at least one large dam constructed on them. More than 50% of the electricity had been generated from the dams in third world countries and half of the large dams of the world were built primarily for the irrigation purpose [1]. The global Water system project collaborate the Earth system science partnership started to collect the world dam and reservoir dataset, that is

“The global reservoir and Dam database (Grand)”, which are providing reliable data of characteristics and geographical distribution of Dams and reservoirs. The grand have 6862 records of dams and reservoirs, but this various database contains only large dams and reservoirs records. floods Dams in Khyber Pakhtunkhwa (KPK) province and Federally Administered Tribal Areas (FATA) of Pakistan can also be considered as important sources for water supply. All these dams were built to prevent areas from flooding to prevent loss of property by floods and serve as for recreation or tourism. These dams are not only used for irrigation, drinking, domestic and electricity generating purposes but the physical and chemical characteristics of these fresh water reservoirs had been found to be suitable

to support a unique biodiversity of flora and fauna consisting of many aquatic plants, invertebrates and vertebrate fauna including various freshwater fish species that are commonly used as nutritionally rich food for local populations. Therefore, many researchers had made important contributions to provide the distributions of fish fauna found in dams, streams and other freshwater reservoirs of KPK and FATA areas in recent past including Hussain and Shah [2]who reported six fish species from River Swat; Ahmad and Mirza [3] also observed 8 species of including two new Loaches from Swat, Butt [4] recorded 94 fish species of fishes from the whole province of Khyber Pakhtunkhwa; Nisar [5] observed 23 species from Tanda Dam of district Kohat, a new production unit at any particular district, in terms of Shahjehan and Khan [6] studied 26 species from BaranDam of Bannu district. More recently, about 18 main species have been discovered from River Swat by Ishaq *et al.* [7] and eleven fish species from River Panjkora at District Dir Upper [8], 20 species from River Arunai Matta, Swat Districtby Akhthar *et al.* [9] and eleven species from Tanda Dam of Kohat district were reported by Haseeb *et al.* [10].

As GIS mapping technology is now proved to be useful modern techniques that can provide guidance, direction of any study area and now serve as an essential local information source for every day. Therefore, present an paper was conducted to provide the geographical distribution and information about the large and small dams and reservoir of KhyberPakhtunkhwa province and FATA areas of Pakistan. These dams mapping have been given in order to help the researchers for future research and provide additional information regarding the dam’s name, coordinates, height, status, purpose, elevation, storage capacity etc. Through maps of any preferred dam, fish culturists can see the penalty of their need to locate at any particular district, in terms of dam’s latitude, longitude, status, dam’s height and for uses also.

**MATERIALS AND METHODS**

**Study Area:** Khyber Pakhtunkhwa (KPK) is located in the north-west of Pakistan. It is bounded by Gilgit-Baltistan on the northeast, Punjab on the southeast and

# Location Map of Study Area

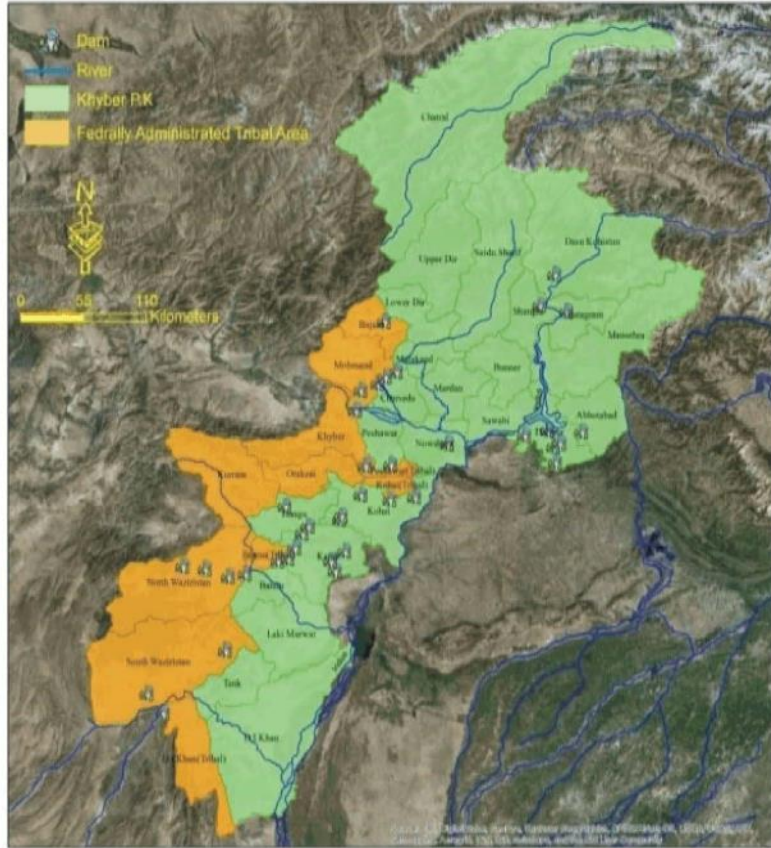


Fig. 1: Location Map of Study Area

Azad Kashmir on the east (Figure 1). A narrow strip of geographically referenced spatial data and relative land belonging to the Federally Administered Tribal Areas (FATA) borders it to the south and directly below that is Balochistan. Its total area is 74,521 Km<sup>2</sup>, has a population of over 22 million. FATA (Federally Administered Tribal Areas) is spread over 27,220 Km<sup>2</sup> and has a population of 3,764,000. It comprises of seven Tribal Agencies and six Frontier Regions. The Tribal Agencies are Bajaur, Orakzai, Mohmand, Khyber, Kurram, North Waziristan and South Waziristan. The Frontier Regions includes F.R. Bannu, Central Kurram, F.R. Dera Ismail Khan, F.R. Kohat, F.R. Lakki, F.R. Peshawar and F.R. Tank [11].

**GIS Mapping Technology:** Present study collected the maximum information of dams from secondary sources, so some dams have missing information. The dam's location identified and mapped using Google earth software and convert to kml format for preparation of layout in Arcmap 10.3 software.

### RESULTS AND DISCUSSION

A geographical information system (GIS) is a computerized system that combines spatial and graphic data for mapping and investigation [12]. The term GIS is currently applied to computerized storage that have hardware and software specially designed to subsist with

projections are significant to anyone working with GIS perfectly in two dimensions. Some information must be distorted. Map projections allow the mapmaker to select which value should be potted in a map. The choice of map projection can affect not only the beauty of the map but also any analyses performed using that map.

There is significant possible to expand inland aquaculture in KPK and FATA to improve food security. GIS modeling techniques is used to identify and map specific sites for fish culturing and GIS tools can assist in allocating more land and water space for sustainable aquaculture expansion. A key issue in aquaculture

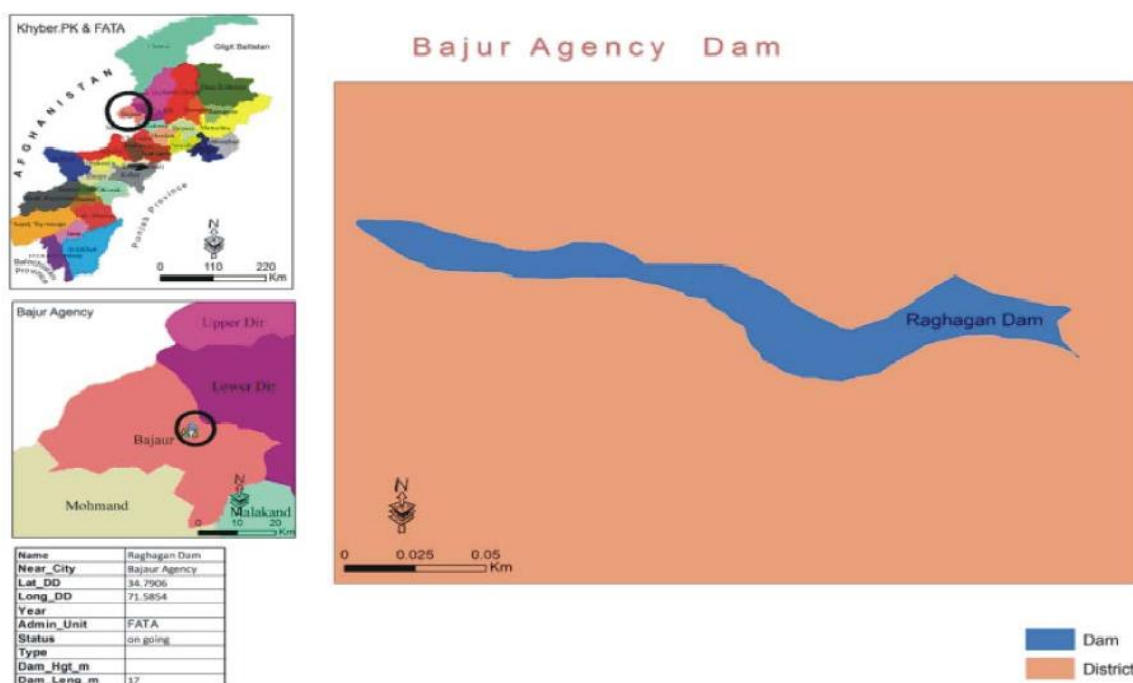


Fig. 2: Raghagan Dam

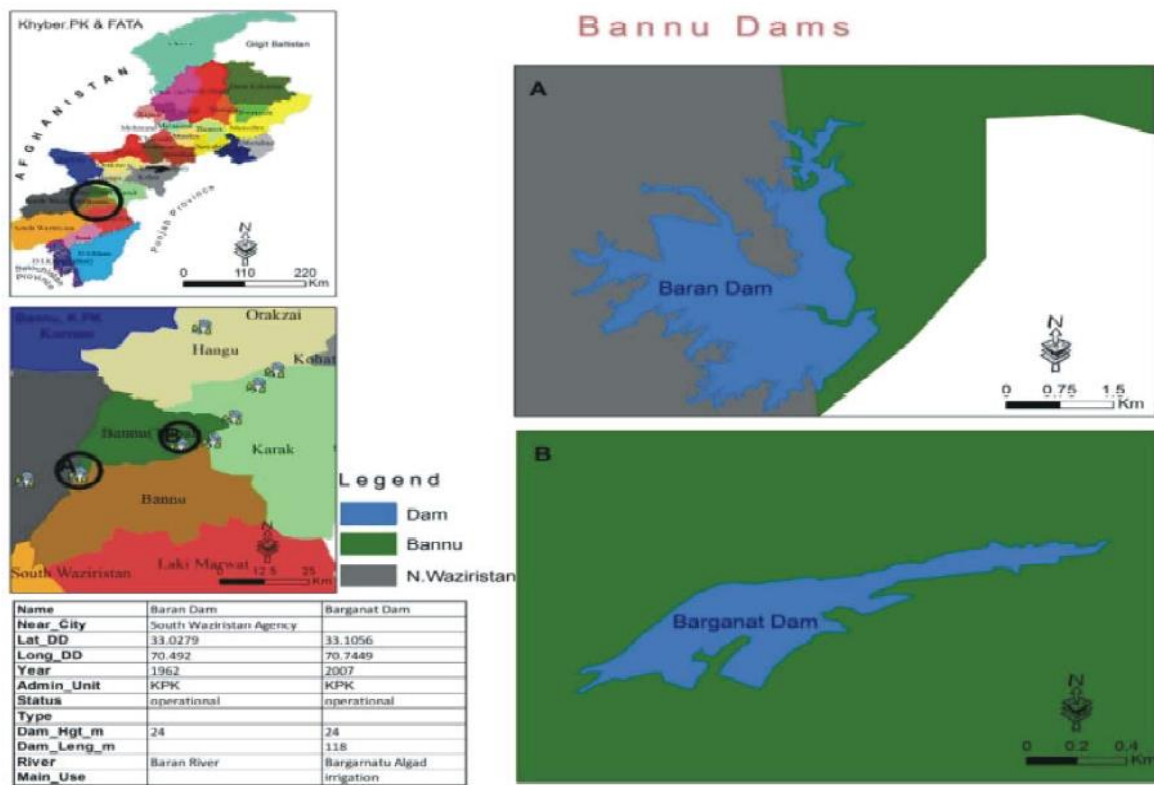


Fig. 3: Barran and Barganat Dams

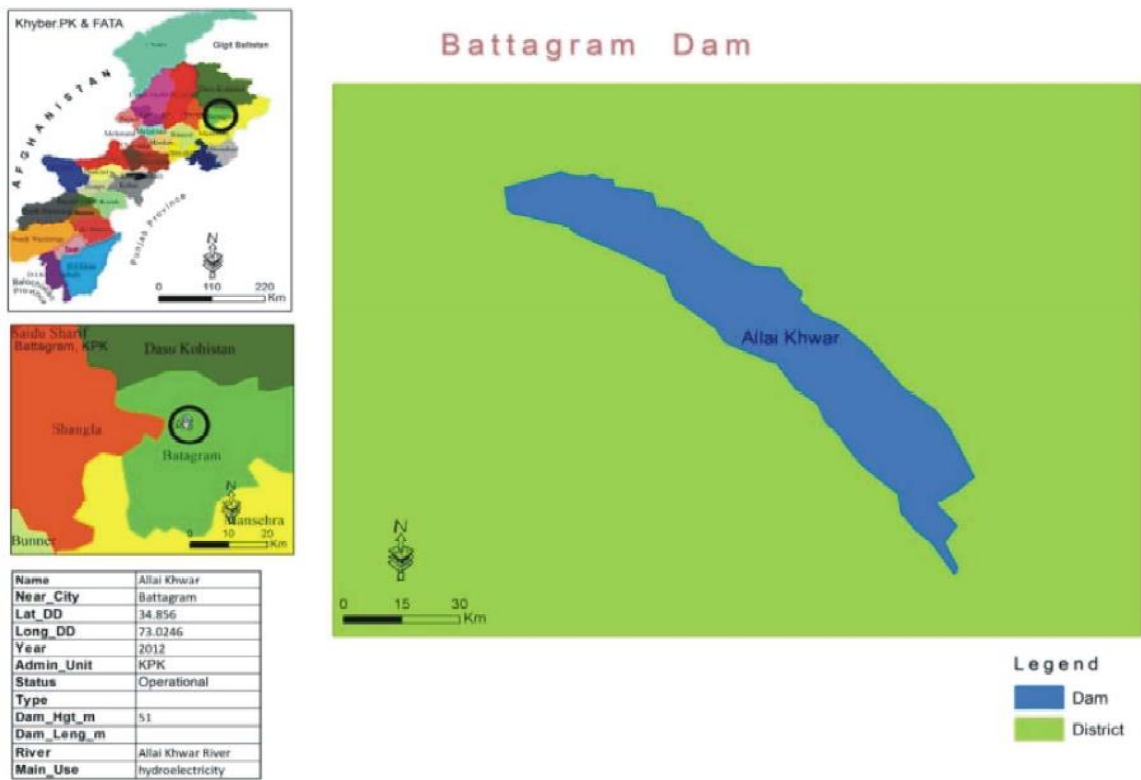


Fig. 4: AllaiKhwar

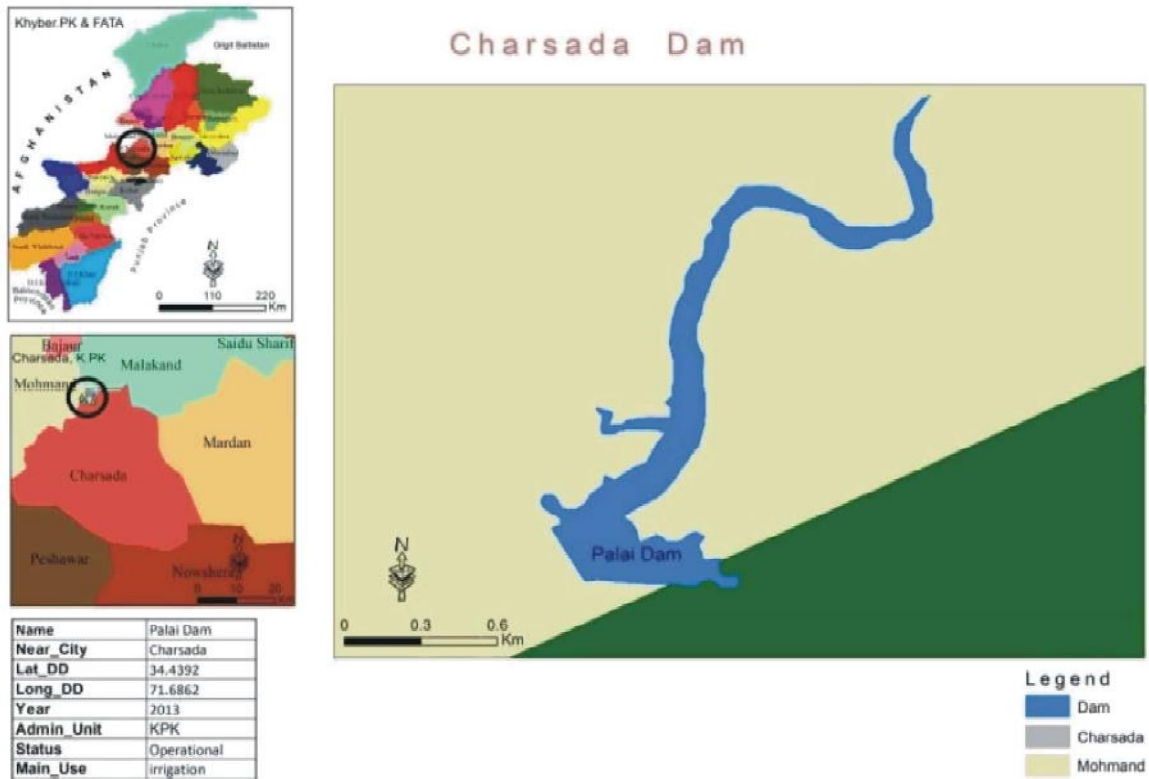


Fig. 5: Palai Dam

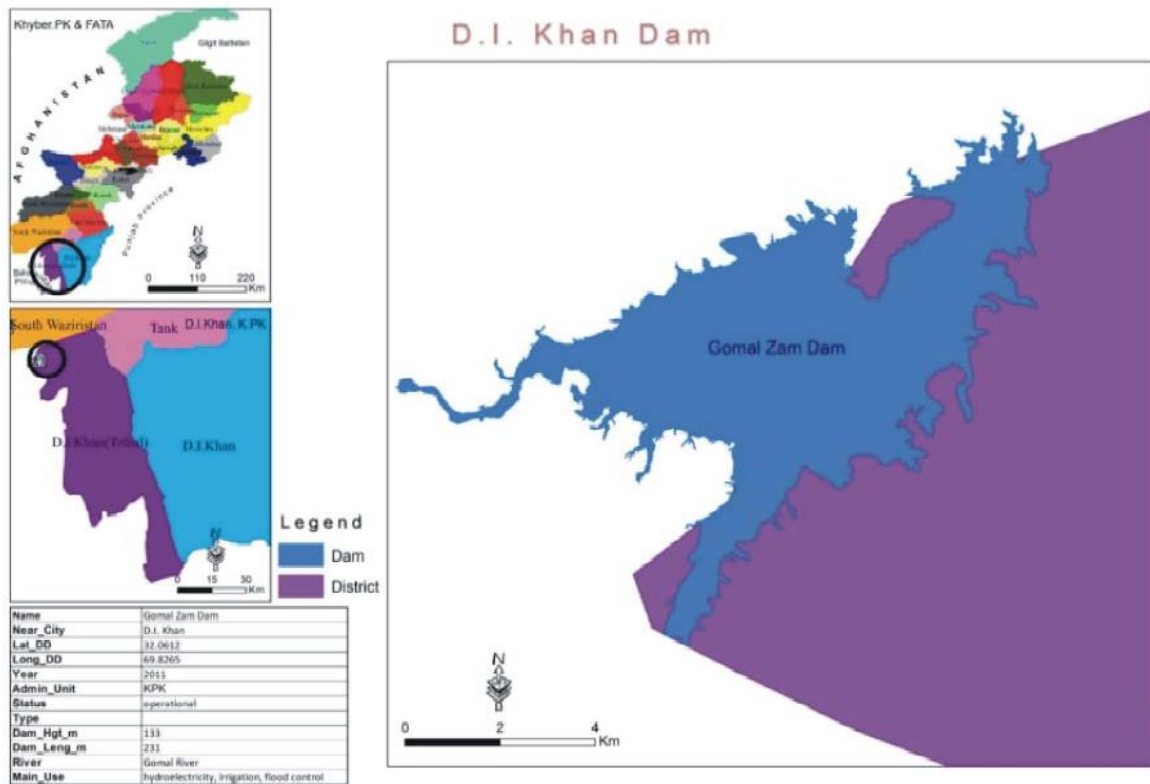


Fig. 6: Gomal Zam Dam

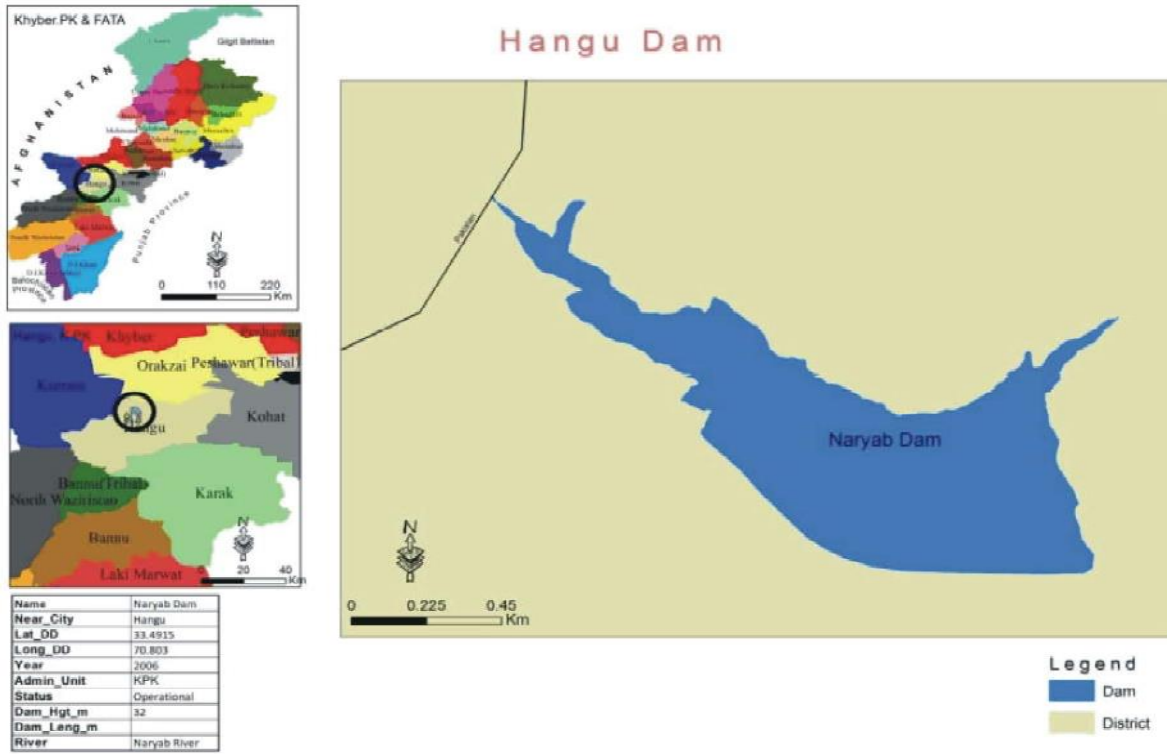


Fig. 7: Naryab Dam

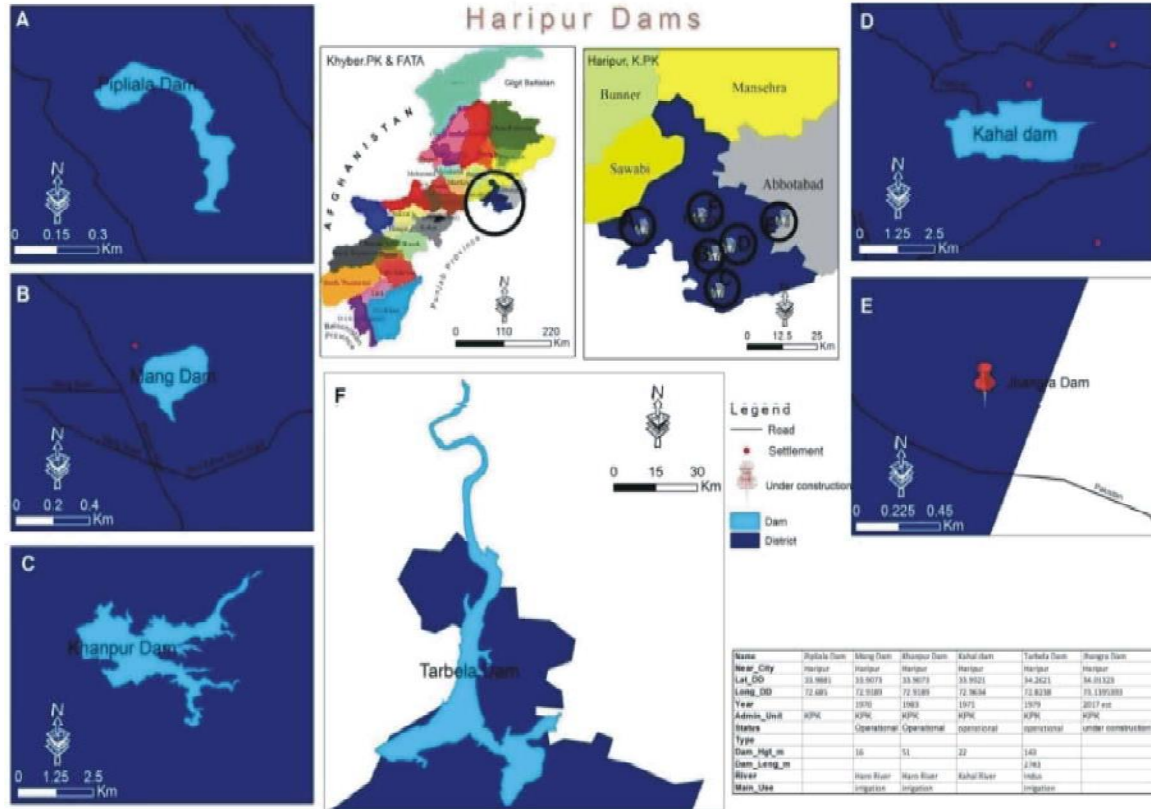


Fig. 8: Pipliala Dam, Mang Dam, Khanpur Dam, Khal Dam, Jhangra Dam

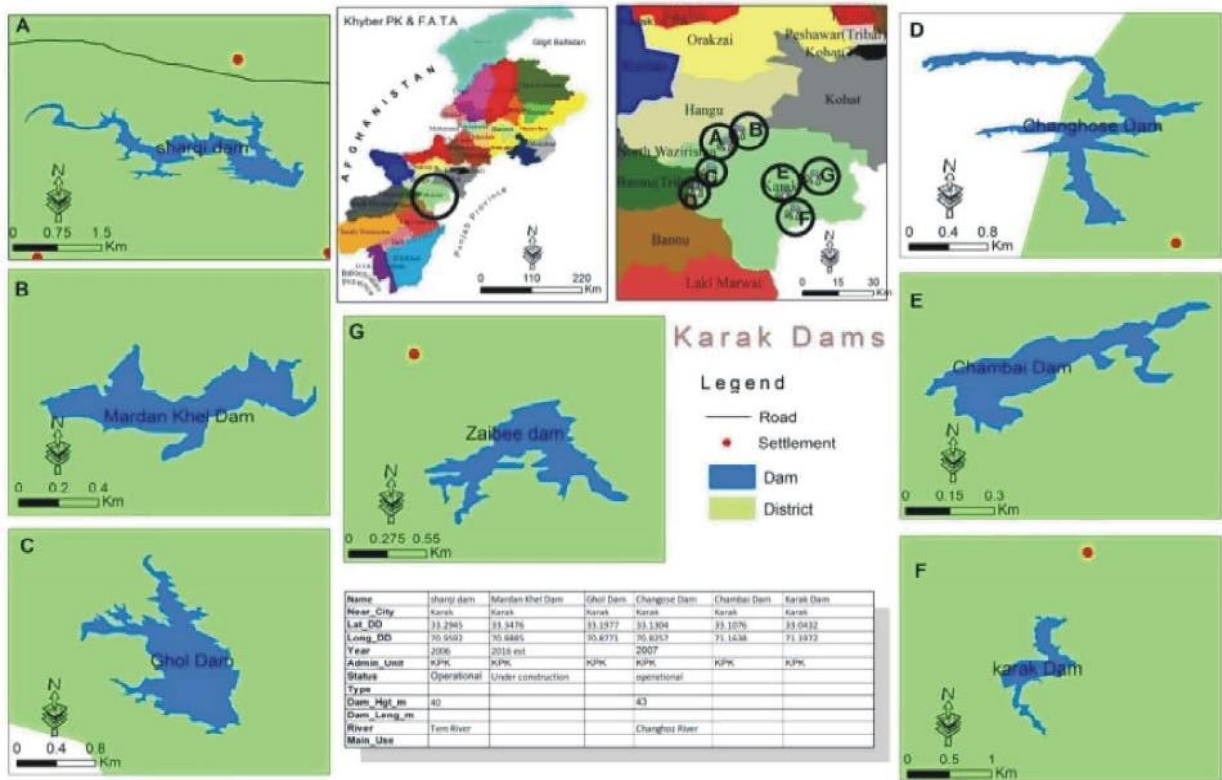


Fig. 9: Sharki Dam, Mardankhel Dam, Gholi Dam, Zaibi Dam, Changhose Dam, Chambaia and Karak Dam

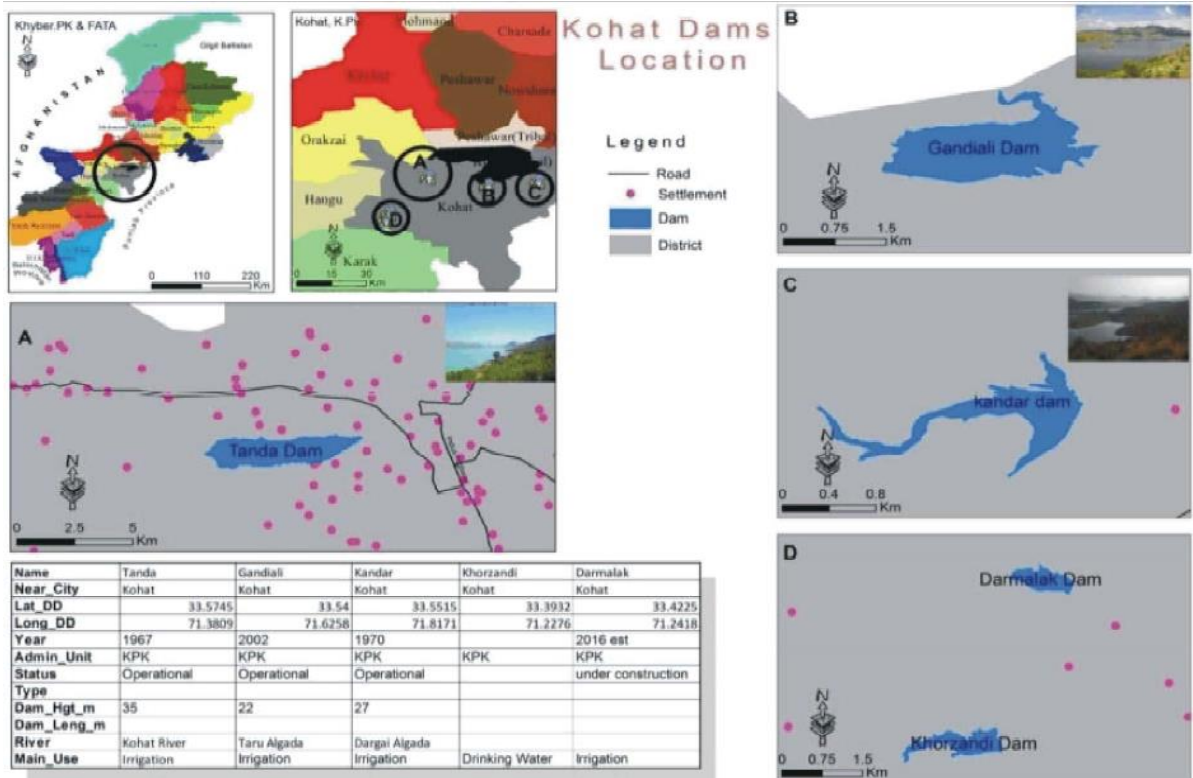


Fig. 10: Tanda Dam, Gandiali Dam, Kandar Dam, Darmalak Dam, Khorzandi Dam

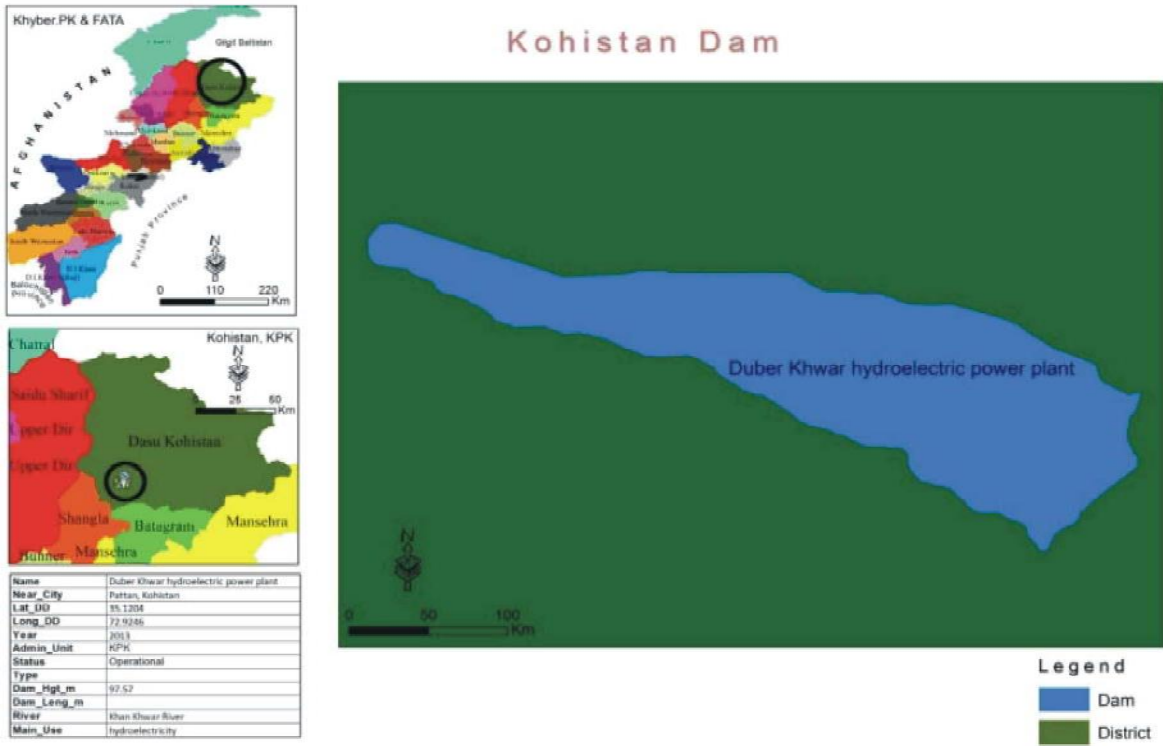


Fig. 11: Duberkhwar hydroelectric power plant

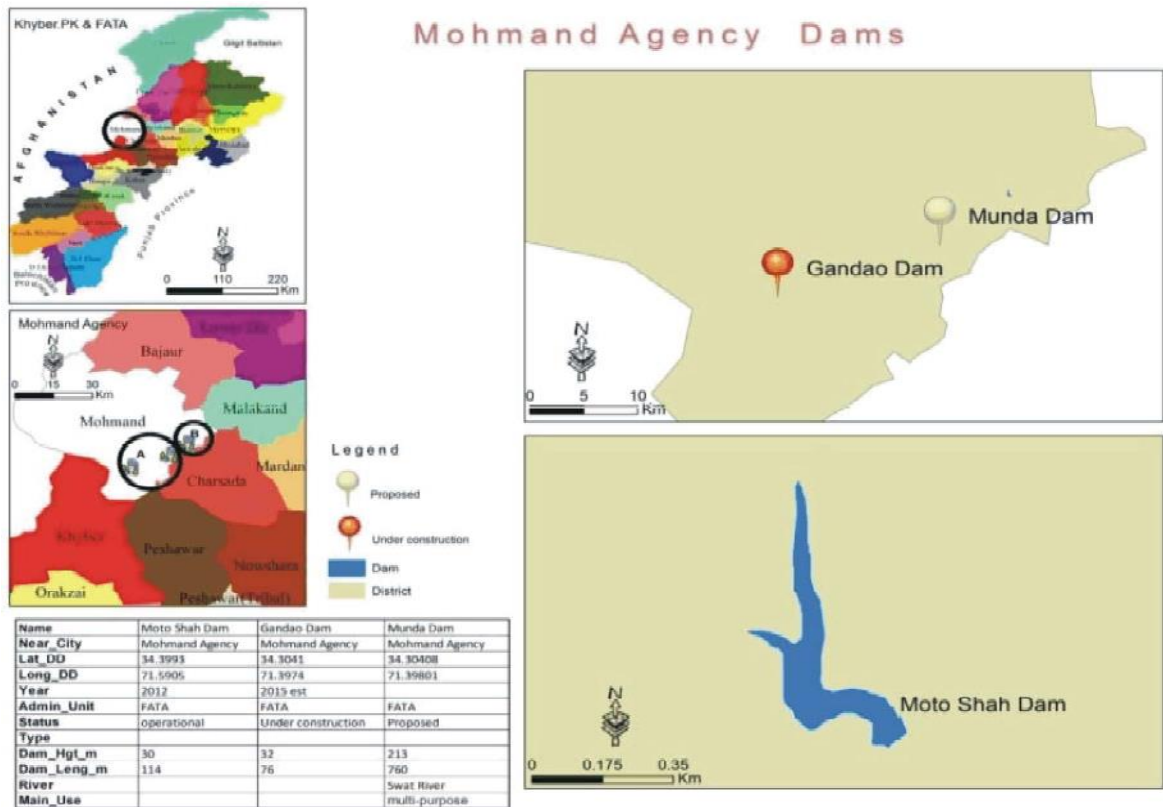


Fig. 12: Munda Dam, Gandao Dam, Moto shah Dam



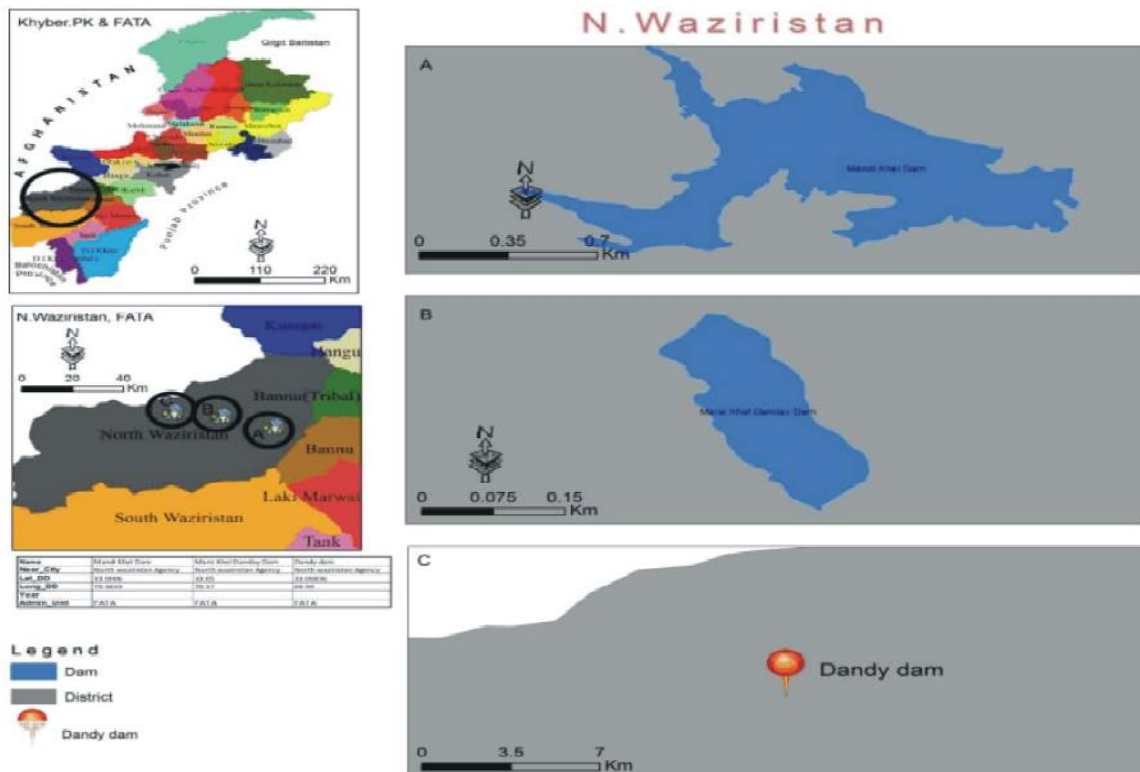


Fig. 13: Mandikhel Dam, Marsikhel Dandey Dam

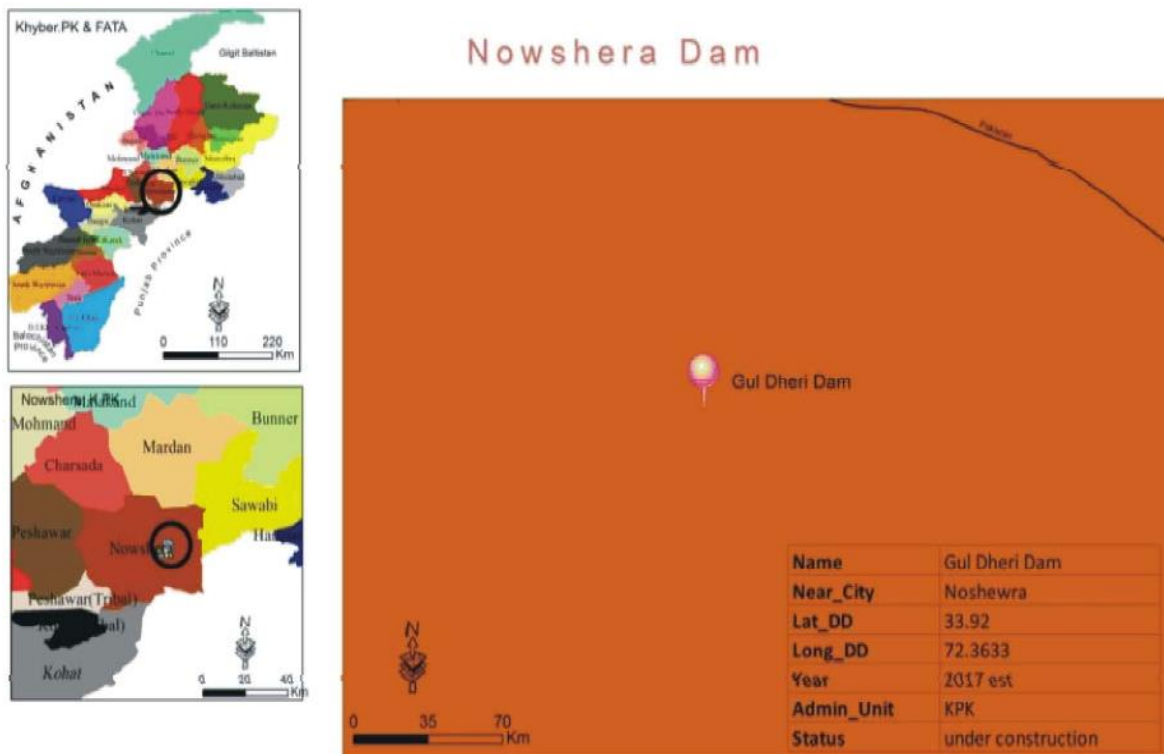


Fig. 14: Gul Dheri Dam

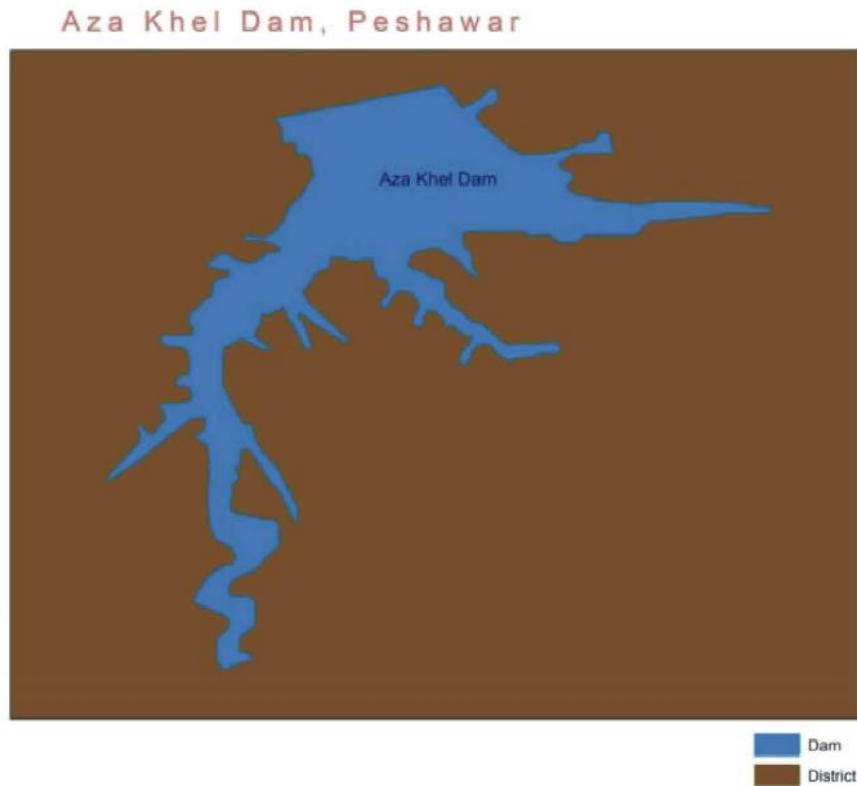
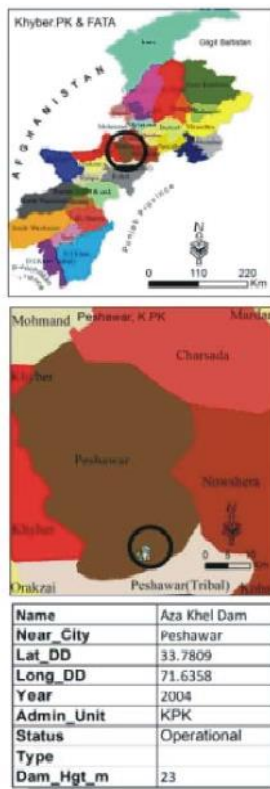


Fig. 15: Aza Khel Dam

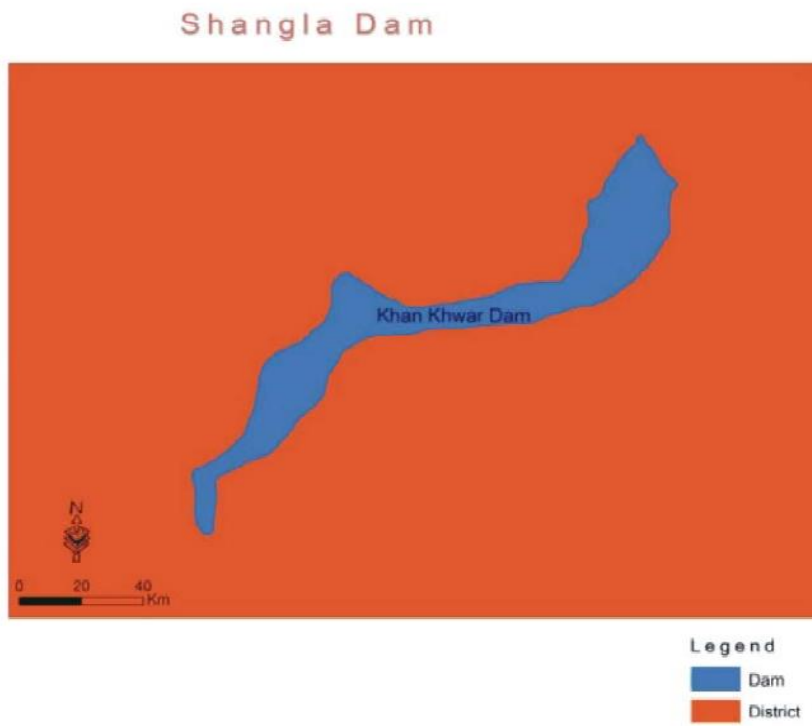
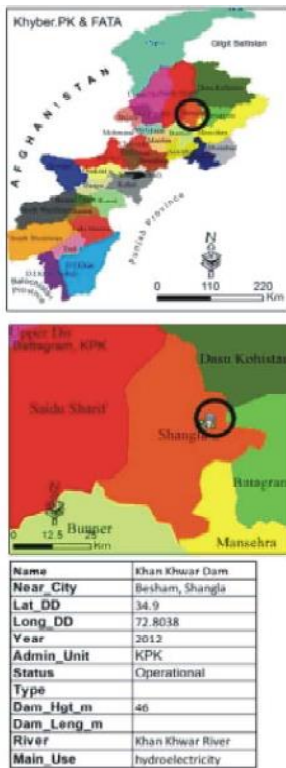


Fig. 16: Khan Khwar Dam

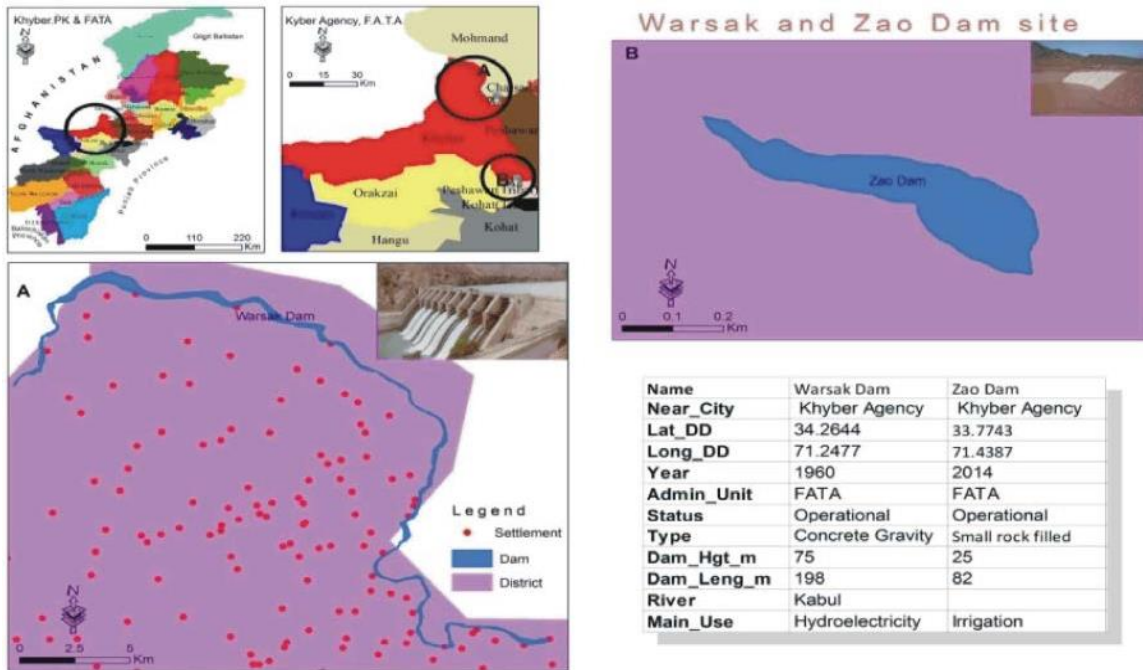


Fig. 17: Warsak Dam and Zao Dam

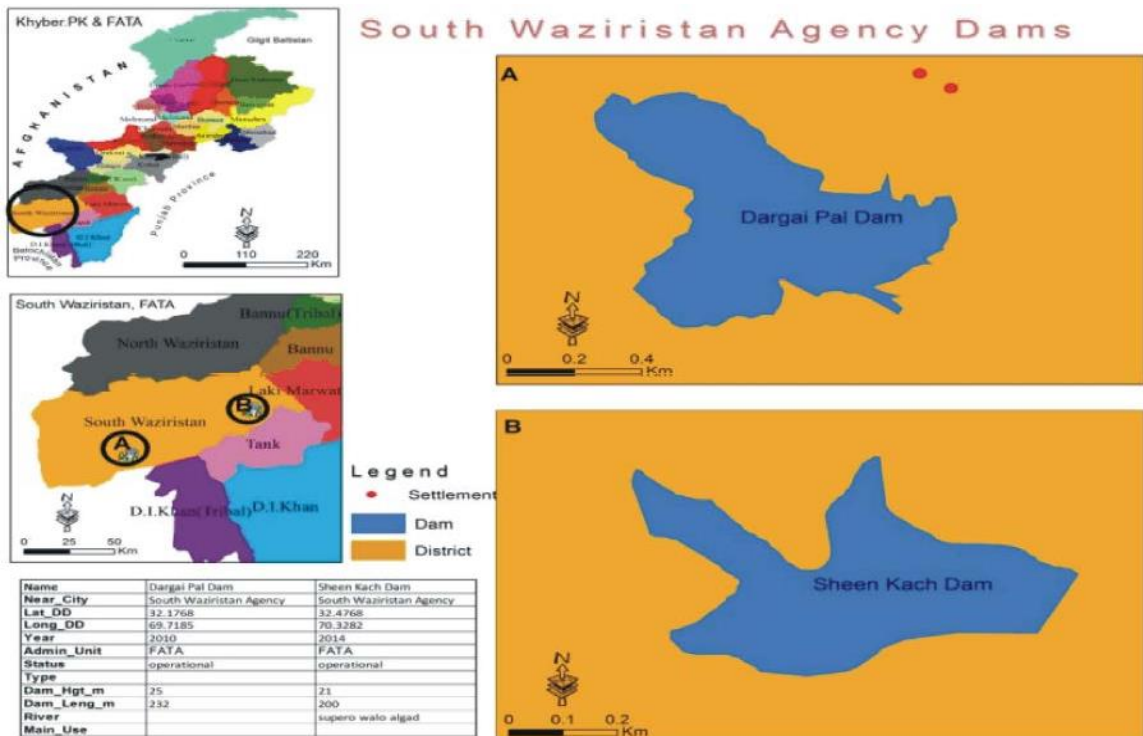


Fig. 18: Dargai Pal Dam and Sheen Kach Dam

development is to define its probable location and scale aquaculture in the KPK and FATA, Pakistan. Our paper and thus the objective of this study was to use GIS to will provide new information's about KPK and FATA assess the potential dams for development of freshwater dams and their worth for fisheries.

From the obtained results, GIS mapping revealed that the most of the KPK dams are found in Karak district, as this district contain seven dams. Whereas, District Haripur has six dam and among them, Tarbelais one of the largest dam of Pakistan as shown in Figures 2-18, respectively. According to the recent investigation, study of some physiochemical properties of water, soil and sediments of Tanda and Gandiali dams of Kohat District revealed that the environmental conditions of these dams were in suitable range required for fish growth, survival and stocking and in addition, also save to be used for irrigation and domestic purpose as reported by Zubia *et al.* [15]. Furthermore, previous studies of some workers including Butt [4], Nisar [5], Shahjehan and Khan [6], Ishaq *et al.* [7], Akhthar *et al.* [9] and Haseeb *et al.* [10] proved that freshwater reservoirs of KPK and FATA areas of rich resources for fish fauna. In addition, among all reported fish species, most species were belonging to the family Cyprinidae that are most commonly used as food fishes in human diet, respectively. Hence, our study will provide new information's about KPK and FATA dams and their worth for fisheries and fish culture in these areas. The district wise spatial distribution maps of KPK and FATA dams are as follows:

### CONCLUSION

From the obtained results of the present study, it had concluded that through GIS with maps of any preferred dam, fish culturists can see the penalty of their need to locate a new production unit at any particular district to improve the conditions of dams for fish growth and survival in terms of water depth, quality, hydrodynamics, existing dam locations and benthic fauna to support the preparation of aquaculture strategies and future which will contribute in the

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economy of the nation. Such information could also be valuable for determining the growth rate and productivity of fishes that later could be valuable in the fisheries management and conservation to further improve the ecological setup necessary for growing fish.

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