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Land topography and feasibility of an elevated-excavated fish Pond a technical version Khyber Pakhtunkhwa, Pakistan

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Abstract
In Khyber Agency fish ponds were constructed under a Developmental scheme "Promotion of Farm Fisheries in Khyber Agency" under the supervision of the Directorate of Fisheries FATA during 2003 to 2009. The purpose of this study is to highlight a significant difference between water and soil level (Land Topography) before construction and between water and bed level of fish pond after construction of an excavated-elevated fish ponds. In this developmental project twenty fish ponds were constructed from 2003 to 2009 in Khyber Agency. Out of twenty constructed fish ponds, eight fish ponds were selected as a sample for study. In these eight samples ponds we checked and measured these differences by using different data collection tools, and those fish ponds, which possess less than two foot difference between water and soil level (Land Topography) before construction were assigned not feasible for excavated-elevated fish pond construction. The fish ponds which have two or more than two foot difference between water and soil level (Land Topography) before construction were assigned feasible for an excavated-elevated fish pond. Digging was make the dike height of pond in such pattern if (digging= dikes height) 1=2, 2=4, 4=8 in feet, simply digging was make a dike of its doublein height and dike slope of its triple, however slope of dike depend on land topography, compaction and its width (thickness).In some fish pond excavation was very difficult due to the selection of hard, stony soil, and as well as those ponds excavated for only one foot while using a tractor so due to its hard nature of soil it was not assigned feasible. It is concluded, that for the construction of an excavated elevated fish pond a minimum difference of two feet inland topography must be required before construction and such a pond when excavated up to two feet can retain maximum of four feet water.

Keywords: Khyber agency, fish pond, water level and fish pond bed level

1. Introduction
Directorate of Fisheries FATA (Federally Administered Triable Area) has launched a developmental project in Khyber Agency "Promotion of farm fisheries in Khyber Agency" for promotion fisheries activities and their shifting from Public sector to Private sector. This Directorate works for conservation, management and development of fisheries resources in whole FATA (Director Fisheries FATA). The aquatic resources of Khyber Agency are rich as compared to other Agencies as there are three main rivers which include river Bara, river Chora and river Kabul and they enter into a Mulaghori area of Khyber Agency from Afghanistan on which Warsak dam is constructed. From River Bara two canals arise which irrigates Akakheil area and second one irrigates Kajoori Spin Qaber Area [1].
The demand by humans for animal protein is continuously increasing and terrestrial farm animals are greatly contributing in fulfilling this. As the population is continuously expanding beyond 6 billion, therefore, its dependence on the production of farmed fish is also increasing. Due to the continuous intensification of aquaculture production, its impact and reliance on freshwater fisheries are likely to expand even further [2]. Fish is a highly nutritious food and providing essential fatty acids and micronutrients in the form of animal protein and consider as a healthy source of vitamins (A, D and E, and Vitamin-B complex) and minerals (especially iodine, calcium, iron, selenium and phosphorus [3]. Fish derived from both culture and capture fisheries sources can make important contributions by improving dietary intakes as well as

promoting nutritional safety among most population groups [4]. From earlier times, fishing from lakes, rivers and oceans has been a great source of food supply and many economic benefits for the humanity. However, for nearly three decades' abusive techniques, illegal catches, unregulated and unreported fishing, worldwide dramatic increase in population and its unlimited demand have been declining fish stocks in wild habitats at an alarming rate. The overall decline of ocean, freshwater fisheries stocks as a result of degradation of habitats [4, 5]. And other anthropogenic factors, population of freshwater species have experienced a drastic reduction in the last few decades and provided impetus for rapid growth in aquaculture [6]. To cope the requirement of white meat fish farming at small scale is needed in the present age. Fish farming is very simple, easily approachable and economically important profession throughout the world. It is obvious that aquaculture practices in future control the balance between wild caught and farmed raised fish, as well as the total availability of fish for human use [7]. Freshwater aquatic culturing in Asia is mostly done on small scales. Most of these farms are owned by families to run their livelihoods and to overcome the food deficiencies. These farms are also very helpful in reducing the poverty scale in Asia. Although farming is done on a small scale, but it is a secure way to meet the requirements of food quality and quantity. Beside a small scale fish culturing, Asia is also successful, contributing in global aquaculture [8].

Before conducting a fish survey of different site and prefer that site which possessing abundant water supply and clay soil, which is easy for excavation. Excavation can be done through different vehicles like tractor, excavator and bulldozer, but Tractor is easily available and comparatively cheap as compared to the excavator and bulldozer. Designing of the pond depends on the purpose for which it was constructed. The building and designing of fish pond is different as compared to ponds designed for another purpose like irrigation, swimming, livestock water supply, wildlife habitat, fire protection home cooling [9, 10]. The aim of the research work was to find out the Land topography and feasibility of an elevated-excavated fish pond a technical version, Khyber pakhtunkhwa, Pakistan.

2. Materials and Methods

In Khyber agency twenty fish ponds were constructed through tractor in a developmental project "Promotion of farm fisheries in Khyber Agency" under the supervision of the Directorate of fisheries FATA. Out of twenty constructed fish pond, eight fish ponds were selected as a study model. An attempt was made to collect dataat time of survey for feasibility and fish pond construction. For data collection different tool like questionnaires, observations, meeting with pond owner and fisheries officially were used. The excavation level was measured by two method first two feet large hole was digging in a corner of fish pond and lime was pour in it for spot indication second graduated iron rod was inserted into the soil in a corner of fish pond before construction and when excavation reached to end of this rod it means it was completed.

Table 1: Showing twenty constructed fish ponds in Khyber Agency in Developmental project in Khyber Agency "Promotion of farm fisheries in Khyber Agency".

S. No	Name of owner (Farmer)	Address	Year of establishment	Area of Fish Pond (Acre)
1	Haji Yousaf	Spin Qaber Tehsil Bara Khyber Agency	2003-04	0.5
2	Haji Misri Khan	MairaAkakheil	2003-04	0.5
3	Haji Hamish	MairaAkakheil	2003-04	
4	Mir Alam	Spin Qaber	2003-04	1.0
5	Abdu-Rehman	BaqarabadJamrud	2003-04	1.0
6	Gul Muhammad	Spin Qaber Bara	2004-05	0.5
7	Sabir	Mairaakakheil	2004-05	0.5
8	Bahawal	Mairaakakheil	2004-05	0.5
9	Qasim Khan	Spin Qaber Tehsil Bara Khyber Agency	2005-06	0.5
10	Abdullah	Spin Qaber Tehsil Bara Khyber Agency	2005-06	0.5
11	Sher Ali	Spin Qaber Tehsil Bara Khyber Agency	2005-06	0.5
12	AqalZarin	Spin Qaber Tehsil Bara Khyber Agency	2005-06	0.5
13	Kashmaloo Khan	MiranTalabTesil Bara Khyber Agency	2005-06	0.5
14	Mohammad Ali	Akakheil Bara Khyber Agency	2006-06	0.5
15	Mosa Khan	BarkiStoriKheil Tehsil Bara Khyber Agency	2006-07	1.0
16	Alif Khan	Baqarabad Tehsil Jamrud Khyber Agency	2006-07	0.5
17	Haji Mehboob	Akakheil Tehsil Bara Khyber Agency	2007-08	0.5
18	EidGhulam	Akakheil Bara Khyber Agency	2007-08	0.5
19	MalakAmdad	Mulagori Tehsil Jamrud Khyber Agency	2008-09	0.5
20	Dil Raj	Mulagori Tehsil Jamrud Khyber Agency	2008-09	0.5

Table 2: Showing selected eight ponds for analyzing difference between water and soil level (Land Topography) before construction of fish pond in Khyber Agency.

S. No	Name of owner (Farmer)	Address	Year of establishment	Area of Fish Pond (Acre)
1	Sabir	Mairaakakheil	2004-05	0.5
2	Bahawal	Mairaakakheil	2004-05	0.5
3	Kashmaloo Khan	MiranTalabTesil Bara Khyber Agency	2005-06	0.5
4	Mohammad Ali	Akakheil Bara Khyber Agency	2006-06	0.5
5	Mosa Khan	BarkiStoriKheil Tehsil Bara Khyber Agency	2006-07	1.0
6	Alif Khan	Baqarabad Tehsil Jamrud Khyber Agency	2006-07	0.5
7	Haji Mehboob	Akakheil Tehsil Bara Khyber Agency	2007-08	0.5
8	EidGhulam	Akakheil Bara Khyber Agency	2007-08	0.5

Table 3: Showing difference between water and soil level (Land Topography) before construction of fish pond in Khyber Agency.

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
S. No	Name of owner (Farmer)	difference between water and soil level (feet) (Topography)	Source of Water	Excavated in feet	Water depth (water retention)column 3 +column 5 (in feet)	Remarks
1	Sabir	1.5	Canal	2.0	1.5+2=3.5	Not feasible as it retains 3.5 feet water, less than 4 feet
2	Bahawal	1	Canal	2.0	1+2=3	Not feasible
3	Kashmaloo Khan	0.5	Canal	1.0	0.5+1=1.5	Not feasible, column 3 is less and soil was hard excavation also less.
4	Mohammad Ali	0.5	Canal	1.0	0.5+1.0=1.5	Not feasible, column 3 is less and soil was hard, less excavated
5	Mosa Khan	12	Stream	2.5	sufficient	Feasible, sufficient water depth
6	Alif Khan	3	Canal	2.5	sufficient	Feasible, sufficient water depth
7	Haji Mehboob	4	Tube well	2	sufficient	Feasible, sufficient water depth
8	Eid Ghulam	0.00	Tube well	2.5	sufficient	Feasible, water level above soil was raised by hydroelectric power of tube well

Table 4: Showing the relation between excavation and formation of height of dike

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
S. No	Name of owner (Farmer)	difference between water and soil level (feet) (land Topography)	Excavated in feet	Dikes formed in feet	Slope of Pond (in feet)	Difference between water level and pond bed level (in feet)column 3+4=Depth
1	Sabir	1.5	2.0 = 4.0		6-8	1.5+2=3.5
2	Bahawal	1	2.0 = 4.0		6-8	1+2=3
3	Kashmaloo Khan	0.5	1.0 = 2.0		4-6	0.5+1=1.5
4	Mohammad Ali	0.5	1.0 = 2.0		4-6	0.5+1.0=1.5
5	Mosa Khan	12.0	2.5 = 6.0		10-12	Sufficient
6	Alif Khan	2.0	2.5 = 5.0		7-9	Sufficient
7	Haji Mehboob	4.0	2 = 4.0		6-8	Sufficient
8	Eid Ghulam	0.00	2.5 = 5.0		7-9	water level above soil was raised by hydroelectric power of tube well

3. Results and Discussion

Feasibility is a vital task for lifetime decision of a developmental project. The success and failure of any project directly related to selection of good feasible site. Once a project was launched on best feasible site it will remain for lifetime otherwise a non-feasible site automatically terminates a project. In table 1 twenty fish ponds were constructed in Khyber Agency in a developmental scheme "Promotion of farm Fisheries in Khyber Agency" under the supervision of Director Fisheries FATA. In table 2 eight fish ponds were selected as model for this study. In these eight selected fish pond, four fish ponds possess problem of water depth and four fish exempted from such problem. Actually the first four fish ponds possess less difference than two feet inland topography before fish pond construction while some fish ponds were constructed on hard, stony soil, which was difficult for the tractor to excavate it up to two feet. Keeping in mind that excavation of all ponds was done with of help of tractor in this project.

In table 3 the difference between water and soil level (Land Topography) before construction were given, in which fish pond no 1, the difference between water and soil level (Land topography) was 1.5 and when it was excavated upto two feet, then its depth was 3.5 feet or we can say it can retain total of 3.5 feet water (1.5+ 2=3.5 feet) so in this fish pond water depth or water retention capacity is less than four feet we assigned this site non-feasible and poorly good. However, water depth or water retention in this pond can be increased by digging soil up to three feet by a tractor, but in majority cases, it becomes difficult for tractor to dig a fish pond more than two feet. For an excavated-elevated fish pond minimum water depth is four feet. In table 4 ponds excavated (digging) up to one foot can be dike of two feet with a slope of four to six and digging of these two feet can make a dike of four feet with a slope of six to eight feet. It can be concluded that digging can make a dike of its double. However, the fish pond dike slope is totally depending on four side land topography, width (thickness) size and its compaction through tractor. Compaction and width size are two factors which can reduce the height of dikes of a fish pond. In enough width (thickness) size maximum soil was used in dike formation so its height can become minimum and compaction is physical process in which the soil of dike was pressed through the running of tractor over it, two or three times during dike formation. During compaction when it was pressed height of dike can have reduced to one third to that of before compaction. In fish pond no 2 the difference between water and soil level is one foot and when it was excavated up to two feet, then their total water retention capacity is3.00 feet (1.0+ 2=3.00) and due less water retention i-e depth of water, this site assigned poorly good and non-feasible for fish pond construction. In both Fish pond number 3and 4 the land topography was less than two feet and both of these excavated up to one foot so total water depth in the pond were one and half feet (1.5 feet). If we observe here, digging was done up to one foot, but in others it was done up to two feet, why, as there the soil was hard, stony which was difficult for digging through tractor and one foot excavation was hardly done with extra use of energy and time consumption. In fish pond number 5, 6, and 7, the difference between water and soil level was two or more than two feet so when these ponds excavated up to two feet their water depth normal and constructed on feasible site. In fish pond number

5 land topography was enough and their source of water was a small stream diverged from perennial river (River Bara) and this pond excavated upto two and half feet (2.5) and an attempt was done for enough slope of the dike of fish pond. After one year we observe the best growth in this pond and grass carp was dominant in growth among silver carp, rohu and mori. The last fish pond number 8 there was zero difference between the water level and selected soil (site) of fish pond, but the source of water in this fish pond was tube well and the water level above soil was raised (elevated) by an electricity power of the tube well. These were the first approach no previous study were found under this studies.

4. Conclusion

Whenever you do surveys for a feasible site, you should keep all basic technical parameters in mind with the help of expertise of specialists; because once you select a site for a developmental project then all your approved money will be spent on this site. Your project objectives achieved when you select a feasible site otherwise on wrong site you spent money, energy and time but gain nothing.

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