COURSE: GEOGRAPHY OF PAKISTAN PART-I (4655)

SEMESTER: AUTUMN, 2019

ASSIGNMENT NO. 1

Q.1 Define the term Physiography? Discuss its three major features including mountains, plateaus and plains.

Landforms

Weathering, water, elevation, sinking, and erosion of the soil are constantly shaping the surface of the Earth. It doesn't really happen overnight but takes hundreds and thousands of years for us to notice these changes. These are the natural processes that lead to various formations of the Landforms. Landforms originate from these geological processes. Let's understand the processes that shape the landforms.

External Process

External process means effects caused by the external factors such as rain or wind. Erosion occurs when material on the surface like soil and rocks which are called sediments are deposited or dropped off in a different location. These natural processes change the surface of the Earth. Erosion and Deposition are the processes that are occurring externally.

Internal Process

Needless to say, internal processes occur inside the surface of the Earth, beneath the crust. The internal process, like Volcanic eruption and Plate tectonics, are caused because of the intense heat in the Earth's core that causes molten rock in the mantle layer to move thus creating uneven movement on the surface. These layers are either uplifting or sinking.

Landforms can be categorized into **Mountains**, **Plateaus**, and **Plains** depending upon their elevation and slope. Let us look at them individually.

Any landmass that is higher and steeper than a hill is called a Mountain. A hill is a landform that extends above the surrounding terrain. Generally, mountains are higher than 2000 ft. In any other natural elevation like atmosphere, as you go higher and higher, the temperature drops down and the climate becomes colder. Habitation becomes harsher. That's why there is less habitation in the mountainous areas.

Due to the temperature drop, it is not uncommon for mountains to develop ice on them. In some mountains, there are permanently frozen rivers of ice called as glaciers. Because of the steep slopes of the mountains, there is less land available for proper farming.

If the surface is calculated considering the sea base as the scale, there are mountains even under the sea. Mauna Kea (Hawaii) in the Pacific Ocean is an example. It is elevated higher than Mt. Everest. Also, a line of mountains is known as a range. For example, the Himalayas in Asia, the Alps in Europe and the Andes in South America. These ranges are the storehouses of water. Many rivers have their origins in these mountains, the glaciers of the mountains are the source of these rivers.

Mountains are generally untouched by civilisations are thus have the endangered species of plants and animals. They also inhibit a rich variety of flora and fauna. Mountains are further divided into three categories:

Fold mountains are created when two tectonic plates collide and the edges of these plates 'fold' because of the enormous push force between them. Scientists classify the fold mountains into 'young fold mountains' are the 'old fold mountains' according to the mountains age.

- The young fold mountains are between 10 and 25 million years old such as the Himalayas in Nepal, the Alps in Europe and the Andes in South America.
- Now, the old fold mountains are older than 200 million years old such as the Aravalli mountains in India (Rajasthan) Ural mountain in Russia.

Block mountains occur when large areas are broken and displaced vertically. These large areas of rock, sometimes stretching across hundreds of kilometres are created by tectonic and localized stresses in the Earth's crust.

The uplifted blocks are termed as horsts. The lowered blocks are called grabens. They resemble piano keys. The examples of block mountains are the Rhine valley and the Vosges mountain in Europe.

Volcanic mountains are formed by magma rising up from the mantle to the crust of the earth. The example of volcanic mountains is Kilimanjaro and Mount Fuji.

Plateaus

Plateaus are elevated flatlands. It is a flat land which is standing above the surrounding area. Plateaus may have one or more sides with steep slopes. Depending upon the plateau their height varies from a few hundred meters to several thousand meters.

The most familiar plateau in India is the Deccan Plateau and these plateaus are mainly formed by lava, meaning they are volcanic in origin. The extension of Deccan Plateau is the Chhotanagpur plateau in India. It's a reserve for minerals such as iron ore, manganese and coal. African plateau is most famous for gold and diamond mining.

The Tibetan plateau is the highest plateau in the world. Plateau regions give birth to the waterfall, for example, Hundru falls in the Chhotanagpur plateau and the Jog falls in Karnataka. These plateaus are also centres for tourism and scenic activities.

Plains

Plains are the most fertile regions. They are stretches of large land. The predominant activity is the primary sector in plains which is A surrounding. These stretches of land are the most suitable for human habitation and agriculture activities like farming and poultry.

Plains are formed by rivers and their tributaries. The rivers flow down the mountains and erode them. They deposit sediments along their courses and in valleys. It is from these deposits that plains are formed. In India, the Indo-Gangetic plains are the most densely populated regions of the country. Where there is water, there is life.

Q.2 Write notes on the following:

i) Vegetations and its variety

Scientists divide the Earth's land into what are called vegetation regions. These areas have distinct types of plants, soil, and weather patterns. Vegetation regions can be divided into five major types: forest, grassland, tundra, desert, and ice sheet. Climate, soil, the ability of soil to hold water, and the slope, or angle, of the land all determine what types of plants will grow in a particular region.

Forest

Forests are areas with trees grouped in a way so their leaves, or foliage, shade the ground. Forests can be found just about anywhere trees can grow, from below sea level to high in the mountains. From tropical rain forests near the Equator to boreal forests in cold climates close to the Arctic Circle, different types of forests can be found all over the world.

One way to classify different types of forests is by the type of trees a forest has. Deciduous forests have trees with green leaves that change color in the fall and drop altogether in the winter. Trees that are common in deciduous forests are oak and maple. The northeastern United States is covered in deciduous forest, and tourists flock to the area every autumn to experience the orange, yellow, and red leaves blanketing the region.

Evergreen forests have trees with leaves that stay green all year long. One of the places evergreen forests can be found is on the opposite side of the North American continent—in the Pacific Northwest, which includes the Canadian province of British Columbia and the U.S. states of Washington and Oregon. The Pacific Northwest is full of evergreen trees like fir.

Sometimes forests are classified by the type of leaves on their trees. Trees in broad-leaved forests have wide, flat leaves. Tropical rain forests are a type of broad-leaved forest. Tropical rain forests, such as Brazil's Amazon Basin rain forest, are found near the Equator. They contain more than half of the world's biodiversity, or variety of plant and animal species.

Coniferous forests have trees with cones and needles instead of leaves. Coniferous forests have the tallest (coast redwood), largest (giant sequoia), and oldest (bristlecone pine) trees in the world.

Many forests are mixed, meaning they have both broadleaf and coniferous trees. The eucalyptus forests of Australia are mixed forests, for instance. The evergreen eucalyptus trees are mixed with deciduous trees like beech.

Grassland

Grasslands are, as their name suggests, flat and open areas where grasses are the dominant type of vegetation. Grasslands can be found on every continent except Antarctica.

Climate plays a role in the type of grassland you get. In cool, mild climates, like northwest Europe, grasslands are dominated by tough vegetation, such as oats, that thrives all year. Some of these grasses are so tough and hardy that they are considered weeds.

In warmer climates, seasonal vegetation survives better. Temperate grasslands exist where there are seasonal variations in temperature over the course of the year: hot summers and cold winters. Different grasses thrive in different temperatures here. Temperate grasslands exist from the prairies of North America to the veld, or rural grassland, of South Africa.

Tropical grasslands are called savannas. They do well in weather that is warm year-round and usually pretty dry. The most famous savannas are in Africa. Serengeti National Park, in Tanzania, has three distinct types of savanna grassland: long grass, intermediate grass, and short grass. This part of the Serengeti is known as the Serengeti Plains, and it supports wildlife from aardvarks to zebras.

Grasslands are important for milk and dairy production; dairy cows are happiest, and most productive, in areas in which they can munch on grass all day.

Tundra

Tundra is an area where tree growth is difficult because of cold temperatures and short seasons. Vegetation in tundra is limited to a few shrubs, grasses, and mosses. Scientists estimate roughly 1,700 different species live in the tundra, which isn't much compared to forests and grasslands. The ground is often too cold for plants to set down roots, and without plants, few animal species can survive.

There are two types of tundra: alpine tundra and arctic tundra. Alpine tundra is separated from a forest vegetation region by the tree line, the area beyond which conditions are too harsh or cold for tree growth. The weather in alpine tundras is cold, snowy, and windy. Most of the Tibetan Plateau, the so-called "roof of the world" located in Tibet, China, and India, is alpine tundra. Animals like mountain goats live in this vegetation region.

Arctic tundra occurs in the far-northern hemisphere of the Earth. It has a bare landscape and is frozen for much of the year. Here, the tundra can include permafrost, or soil that is permanently frozen. Russia and Canada have huge areas of arctic tundra. During the summer, the permafrost thaws just a bit, allowing some plants to grow in the wet, marshy ground. You won't find many mammals in the arctic tundra, but thousands of insects and birds show up every year and enjoy the marshes before they freeze. Among the few mammals that actually thrive in the arctic tundra are caribou and polar bears.

Desert

Deserts have almost no precipitation, or rainfall. In fact, deserts are specifically defined as areas with an average annual precipitation of less than 10 inches per year. Deserts usually have really high daytime temperatures, low nighttime temperatures, and very low humidity.

Desert soil is often sandy, rocky, or gravely. Plant life is highly specialized to adapt to these coarse, dry conditions, with long roots, small leaves, stems that store water, and prickly spines

that discourage animals from touching or eating them. Cactuses, which are native to deserts in North and South America, are an example of this kind of plant. Despite the barren look of hot deserts, they are full of animal life. Most desert animals, such as lizards or snakes, are nocturnal, meaning they are active at night. Nocturnal animals take advantage of the cooler nighttime temperatures of the hot desert.

Not all deserts are hot and sandy, however. The largest desert in the world is the Antarctic Desert, which takes up most of the continent of Antarctica. In the Antarctic Desert, ice sheets cover barren rock. Few animals can live in the Antarctic Desert. Those that do are often microscopic, such as lice.

Ice Sheet

The interesting thing about the ice sheet "vegetation region" is that there really isn't any vegetation there at all! An ice sheet is a large stretch of glacier ice that covers the land all around it for more than 50,000 square kilometers (20,000 square miles). Currently, the only ice sheets are in Antarctica and Greenland. Don't confuse the ice sheets, called polar ice caps, with other ice shelves or glaciers; an ice sheet is much, much bigger.

Ice sheets are important research sites for scientists. The Antarctic ice sheet is a record of Earth's atmospheric changes. By looking at layers in the ice, scientists can keep track of different levels of pollution or volcanic gases in the atmosphere. The 1883 eruption of the Indonesian island volcano of Krakatoa can be located and dated by the distinct air bubbles in the Antarctic ice sheet, for instance.

Scientists are also studying ice sheets to measure the rate of melting ice. Parts of the Greenland ice sheet were once thought to be permanent, but they are now melting at a fast pace.

ii) Advantages of forests

Forests have a bundle of advantages but only a few can be highlighted by a person living in an urban area. Firstly, from an ecological point of view, they play a vital role in keeping the environment clean as it is the only source of oxygen. We all know that without oxygen non creation can survive. For wildlife it acts like a habitat. Forests also prevent soil erosion. Forests also reduce the chances of floods. Big trees absorb excess water in rainy season thus reducing floods and destruction.

Secondly, from a commercial point of view, they also provide the raw material used for wood based industries. They are a source of timber which is used for construction. Small plants grown can be used for medicinal purpose in pharmaceutical industries.

Moreover, forests also contribute in improving a country's economy, they attract tourism. Almost 700 million international travellers visit Amazon Rainforest in South America every year and the number is rapidly increasing. So if we are successful in reestablishing our forests we can also have a large number of international travellers every year that will boost our economy. Forests also provide employment opportunities because they are originating fruits. Good quality fruits can also be exported which will increase foreign exchange.

However, restoring forests back to Pakistan can lead to a big change in the country. Therefore, a forest conservation programme should be started in the whole country.

Q.3 Discuss the major features of Pakistan's hydrology. Also elaborate the importance of rivers, lakes and canals.

Dam, structure built across a stream, a river, or an estuary to retain water. Dams are built to provide water for human consumption, for irrigating arid and semiarid lands, or for use in industrial processes. They are used to increase the amount of water available for generating hydroelectric power, to reduce peak discharge of floodwater created by large storms or heavy snowmelt, or to increase the depth of water in a river in order to improve navigation and allow barges and ships to travel more easily. Dams can also provide a lake for recreational activities such as swimming, boating, and fishing. Many dams are built for more than one purpose; for example, water in a single reservoir can be used for fishing, to generate hydroelectric power, and to support an irrigation system. Water-control structures of this type are often designated multipurpose dams.

Auxiliary works that can help a dam function properly include spillways, movable gates, and valves that control the release of surplus water downstream from the dam. Dams can also include intake structures that deliver water to a power station or to canals, tunnels, or pipelines designed to convey the water stored by the dam to far-distant places. Other auxiliary works are systems for evacuating or flushing out silt that accumulates in the reservoir, locks for permitting the passage of ships through or around the dam site, and fish ladders (graduated steps) and other devices to assist fish seeking to swim past or around a dam.

A dam can be a central structure in a multipurpose scheme designed to conserve water resources on a regional basis. Multipurpose dams can hold special importance in developing countries, where a single dam may bring significant benefits related to hydroelectric power production, agricultural development, and industrial growth. However, dams have become a focus of environmental concern because of their impact on migrating fish and riparian ecosystems. In addition, large reservoirs can inundate vast tracts of land that are home to many people, and this has fostered opposition to dam projects by groups who question whether the benefits of proposed projects are worth the costs.

All that area of blue waterways is flowing into the Indus, and down through the country. These rivers include large gatherings into the Chenab, Sutlej, Zaskar, Nubra, and Shyok, all of which spill into the Indus. Yes it does include some parts of northern India/Kashmir and eastern Afghanistan. But note how it also covers almost all of the land in northern Pakistan. So in the end, almost every drop of rain that falls on Pakistan, from the northern mountains, to the deserts, to the heartland, to the Iranian border, all of it already flows further on into Pakistan for use. In the end, there's only a few tiny slivers of land in the country where water falling on the country is lost by flow to other countries (such as places like near

Chaman). What may be confusing about the image you gave is the gray colors up in the north, nearer the Basha [as well as in southwestern Pakistan]. But those colors aren't showing that water there isn't coming into Pakistan, but only that that area isn't irrigated land. Basically all the water in those gray areas, like the Pakistani portions of the Hindu-Kush/Himalayas/Karakoam Mountains, flows down into the Indus and through Pakistan. Plus even more additional water from neighboring countries. So in other words Pakistan gets more water than what falls on it. Other countries definitely aren't so lucky. And that water is already coming down into the rest of the country. In terms of *feeding* the country, irrigation could maybe be expanded a bit... but I believe the problem isn't just the lack of water... but that a lot of the rest of the soil is fairly poor for growing. The book Pakistan's Soil Resources (available online) classifies more than 1/4 of the country's soil potential as "Agriculturally unproductive or non-agricultural land" due to wind erosion, salinity, extremely low, etc. (Some additional land might be made arable by leeching down salt levels, but I believe it would take long periods of time and great amounts of water. Soil Quality and Agricultural Sustainability, by Rattan Lal, (Google Books preview) looks to include some interesting description of the greater complexities and some longterm potentials of many areas of the world, including Pakistan.) On the other hand, it sounds like the more urgent concern maybe isn't eating but drinking? (disappointingly, I think you'll find that most other parts of the world probably aren't very aware of your problem... I certainly wasn't). Unfortunately this problem trend is showing up in many other places, such as well-publicized recent issues in southwestern South Africa. In the end, the primary problem for much of Pakistan's population likely doesn't stem from the complete lack of water... but instead from the lack of needed infrastructure, pollution issues, and mismanagement, as this article alludes to. These are issues that the entire world does struggle with (such as the troubles in Flint in the USA). There are already some parts of the world there are literally growing concerns of not enough water existing in entire regions to sustain it whatsoever (such as in the SW US/impacting NW Mexico) But if the Indus is flowing steadily down to the ocean through your country (please do indicate if its not, the problem may be more serious then!!), it's not a matter of no water, it's the challenge of detouring enough to areas to meet needs, and keeping it clean. Karachi does look a bit of a challenge area on a map. The good news is it's only 60 miles from the Indus. Quite a few places source their water from such a distance - some places even do get it from hundreds of miles away, even from the far side of mountain ranges as you kind of suggested. But the unique challenge is likely how flat the land is in the south nearer Karachi. Places like California and Rome can take advantage of elevation to better feed the distant water via gravity. Karachi on the other hand may require much more pumping to get the water from the Indus, and that might well not be cheap/easy over even distances like 50 miles? (As noted, It looks like most of the N Pakistani mountains are south of the continental divide,

so almost all their water flows your way already. The few miles of snowpack flowing into Tajikistan and such a) may well be needed by their people and b) could be diverted into the Indus with some effort... but that won't solve problems if the Indus is already steadily flowing. The Suleiman Range might offer some options to divert a little more water west of the Indus using tunnels like in the LA Aqueduct... but that would depend a great deal on the specifics of the topography and precipitation levels in those mountains for feasibility.) So, indeed, all that water from your mountains is indeed flowing right through the heart of Pakistan, "right by your window" almost (plus the gift of extra input from areas of far northern India). It's just getting it from the Indus to where it's needed. And it just needs to be taken care of carefully.

Q.4 Define the agricultural industry? Give you arguments that how stock, poultry and fishing had become the industries in Pakistan?

Agriculture is considered the backbone of Pakistan's economy, which relies heavily on its major crops. There are vast gaps between the acquired and actual output of produce, which suffers due to a lack of appropriate technology, use of inputs at improper times, unavailability of water and land use and inadequate education about insect pest control, which not only negatively affects the produce but also significantly reduces the amount of produce. Farmers mainly use synthetic chemicals for the control of insect pests, but these are used unwisely. To emphasize the major shortfalls and actual performance of major field crops, this study investigated the relationship between agricultural GDP and the output of major crops, including wheat, rice, sugarcane, maize and cotton, in Pakistan over a period of 65 years from 1950 to 2015. Time series data were collected from the Economic Survey of Pakistan (various publications). Crop data were analysed using the ordinary least square method and the Augmented Dickey Fuller (ADF) test, and the results were interpreted using Johansen's co-integration test. Our study finds that the output of wheat, rice and cotton has a positive and significant relationship with the agricultural GDP of Pakistan, while the output of sugarcane has a negative and non-significant relationship with the agricultural GDP of Pakistan. Therefore, this study recommends that the government of Pakistan should launch new funding programmes for the development of the agricultural sector. Agriculture is an important sector of Pakistan's economy. This sector directly supports the country's population and accounts for 26 percent of gross domestic product (GDP). The major agricultural crops include cotton, wheat, rice, sugarcane, fruits and vegetables. The irrigation system of Pakistan belongs to one of the world's largest systems to support agricultural production. There are two main seasons in Pakistan for production of crops: crops such as cotton, rice and sugarcane start in May and are harvested in November, whereas the wheat crop extends from November to April. A key urgent need to improve agricultural production is to use resources, mainly land and water, more efficiently. However, the change is mainly dependent on large landowners, who own 40 percent of arable land and control most of the irrigation systems, making it difficult to pass wide-ranging reforms. Pakistan is a net importer of agricultural

products, with total annual imports of approximately 2 billion USD, including wheat, edible oils, pulses and food additives.

In the wheat production system, Punjab, which is Pakistan's irrigated province, has had a historical focus on a green revolution in wheat. During the 1960s, the Green Revolution in Pakistan also involved public investment in irrigation canals and market development (Renkow, 2000). The rural society and wheat production were transformed; the anticipation of starvation retreated (Hazell, 2010). Despite this applauded improvement, the sustainable production of wheat remained the primary focus of Pakistan's population. The government of Pakistan still needed improvements for the production of wheat in different varieties. Previous research on the wheat crop has shown a slow growth rate of crop variety replacement by farmers in promoting new varieties of wheat in Pakistan (Heisey, 1990, Iqbal et al., 2002). In 1997, an estimated area of one million ha was used for wheat production, which was 51 percent of the entire wheat area in Pakistan (Smale et al., 2002).

Pakistan plays a major role worldwide as a rice exporter, and it annually exports approximately 2 million tons, which is 10 percent of the world's trade. In Basmati rice, approximately 25 percent of exports is Pakistan's share. Rice exports are the second highest source of income in Pakistan. Rice grains fulfil approximately 60 percent of the population of Pakistan's food needs, and rice is a potential source of food worldwide for animals during the winter (Drake et al., 2002, Nguyen et al., 2008). Rice is an important food for Pakistan. The usage of pesticides increased after the 1950s, when 250 metric tons of pesticides were imported for greater improvement of production. Its usage increased by 2158.6 percent from 1952 to 2004 (Khan et al., 2010).

Cotton is another cash crop of Pakistan, and Pakistan is the world's largest producer of raw cotton. In 2011–2012, Pakistan ranked as the 4th largest cotton producer, with a 9.81 percent share in global cotton. In the same period, Pakistan's yarn exports contributed 26.1 percent and 14.3 percent to the global market. Cotton exports accounted for 46 percent of Pakistan's total exports and provided 35 percent employment to the labour force (FAO., 2012, GOP., 2012). According to current agricultural policy, the Pakistan Central Cotton Committee has aimed to increase the production of cotton from 40 percent to 60 percent (PCCC, 2008). However, some evidence has shown that insufficient irrigation water is one of major problems in agricultural production in Pakistan. Farmers commonly apply water to furrowed fields by flood irrigation, resulting in low agriculture water productivity (Kahlown et al., 2007).

Maize is another cash and food crop of Pakistan, serving as feed as well as silage, and it is a high yielding cereal crop globally. After wheat, rice and cotton, maize is the fourth chief cereal crop of Pakistan, it is mainly sown in two seasons: spring and autumn. In spring, it is planted from February to March, while for autumn, maize is grown from July to August. The maize life cycle depends upon the availability of water; the water discrepancy at any phonological stage, i.e., reproductive and maturity stages, has several retorts and can damage the grain yield, and

previous research (Heisey and Edmeades, 1999) has shown that drought stress also causes grain yield damage when it occurs in the reproductive stage of the crop's life cycle.

Sugarcane is a high-value cash crop of Pakistan and is quite important for sugar-related production. It accounts for 3.4 percent of additional agricultural value and 0.7 percent of the gross domestic product (GDP). As a sugar crop, sugarcane is the chief biofuel crop worldwide (Robinson et al., 2011). The slow growth rate of sugarcane in the early stage provides space and resources for intercropping in the field. Many studies have shown that sugarcane intercropping with other crops, such as peas, watermelon and onions, could decrease the yield of sugarcane and could increase economic income significantly.

For Pakistan it is considered that in most farms crop production as well as livestock production are carried out simultaneously. The farmers utilize the common factors of production but produce different products of almost equal importance. The contribution of crops and livestock to GDP is almost at the same level. The only internal relationship and interdependence is that livestock gets the input of fodder from crops growing activities and crops get the input of ploughing and planking for the preparation of fields and for sowing crops from the livestock related activities. The output of one activity (fodder) becomes the intermediate consumption for the other activity (livestock) and vice versa. The GVA will be invariant but the output and intermediate consumption will increase accordingly. The output of each activity will be separately and independently available. The advantage is that the figures for the output of crops will comply with those of the crop reporting system. Similarly the published data on livestock will be compatible with the data entering in to the estimation of livestock contribution to national accounts. The only problem is that some overhead inputs have to be allocated to one of the activity or has to be distributed to the different activities by some sort of key. For most farms in Pakistan the overhead inputs are minor or even negligible. The above mentioned option of the SNA has been chosen to make use of data which refer to products mere than to establishment. The data situation allows for recording output, intermediate consumption and value added for certain kinds of agricultural products as if they were produced in homogeneous production units. Homogeneous production units in the SNA are foreseen for input-output tables. It may be seen as a paradox on that in the informal sector of agriculture figures for enterprises or establishments are lacking but figures for the most challenging form of statistical units (which is the homogeneous production unit) are available. The reason lies in the excellent empirical basis which in Pakistan refers to products and not to their producers. It is a huge advantage that in Pakistan the different kinds of inputs can easily and fully be assigned to either crop production or livestock though most of the farms combine both kinds of activities. There are almost no inputs which have to be considered overhead cost and serve both activities. The same is true for the output side. All products, either sold or consumed by the farmers' households themselves, are easily to be classified as either crops or livestock. Both kinds of activities are independent from each other with the only

exception that livestock is used as draught power and is getting its fodder out of crop production.

The result may at first glance be astonishing: in a sector which can almost completely be characterized as "informal" we, nevertheless, have a quality of data which is much better than in most parts of Pakistan's "formal" economy, e.g. large scale manufacturing.

For the economy at large with its heterogeneity of products and services the SNA recommends the establishment as the appropriate statistical unit to study production and production functions in detail. It considers it as the best compromise between observability and homogeneity of production (SNA 2008, par. 2.38). The statistical unit chosen for this survey is even below the establishment level. It covers each of the two kinds of activity which most farmers in Pakistan practice: crops and livestock and comes quite close to a concept of units of homogeneous production which in the SNA is meant for pure analytical purposes related to input-output estimates.

As we can clearly separate data on crops from those on livestock we can even go a step further: with some assumptions we can even allocate the inputs on crop production at large to the various kinds of crops. This is considered to be done during the preparation of the Supply and Use Table 2005-06 which is also part of rebasing of National Accounts

For the livestock part it had been decided to skip asking for the inputs (mainly oil cakes, pharmaceuticals and veterinarian services) during this round of rebasing and to estimate them on the basis of the study carried out for 1999-2000 rebasing, instead. But an additional questionnaire was utilized to cater for the data on animal production.

Livestock is raised and crops are grown by the Pakistani farmers simultaneously. Nevertheless, crops contribution to gross domestic product (GDP) has been valuated separately. The reasons for that have been explained at the beginning of crops sub-sector under the conceptual issues. This part will deal with the practice of raising livestock and hence its contribution to output and gross fixed capital formation (GFCF) as cultivated biological assets. Poultry and poultry products, animal husbandry and hunting will also be dealt within this part.

The growth and regeneration of livestock under the control of farmers is treated as process of production in an economic sense. Many animals take some years to reach maturity. The increase in their value is taken as output and treated as increase in fixed capital (if raising is for breeding purposes or for dairy production or for draught power) or as inventories (if the animals are raised to be slaughtered) according to the System of National Accounts (Para 6.138 of SNA 2008). The animals produced on own account for breeding purposes and the like which are immature and not ready to be used in the production process, are treated as gross fixed capital formation and being acquired by their producers at the time of their production (Para 10.89 to 10.91 of SNA 2008). Incidental losses of animals due to occasional deaths from natural causes form part of Consumption of Fixed Capital (CFC) (Para 10.94 of SNA 2008). The other livestock products are milk, draught power, dung and urine and wool and hair. The data on these products have been supplied by the livestock division of agriculture ministry. The missing

link is the prices of these items which had been collected through the agriculture input–output survey, cross checked from other data sources. The milk production for human consumption only has been valued. Milk for breeding calves has been excluded from the production as well consumption. The valuation of draught power has been annexed. It has been calculated by indirect method as it is not common to hire the animals for ploughing and planking. Equivalent output has been applied for valuation. Unit prices have been applied to the quantities of dung and urine and wool and hairs. The population of livestock is given at Annexure X. Data on milk production, dung and urine, wool and hairs, poultry and poultry products have been annexed as annexure XI. Estimation of draught power has been attached as annexure XII. The questionnaire has been attached as annexure XIII. The sample list and data collection methodology has been explained in the crops sector report. The data are available on farming and on domestic poultry separately as a product of livestock census. Farming poultry is managed on scientific bases. Data are provided on number of layers, broilers, breeding stock and chicks and eggs in farming. This segment is called as commercial poultry. In domestic poultry, data are provided on number of hens, cocks, chicken and eggs. This category is generally available in the rural part of the population. Organized market structure does not exist for this segment. The price structure has been adopted from the price statistics of federal bureau of statistics. The major products are eggs and meat. Generally live birds are sold on the market. Poultry meat is also reported by the ministry. This activity is divided in to two categories, marine fishing and inland fishing. The input structure and jurisdiction of these activities is totally different. Inland activity is concentrated in the areas where suitable underground tube well water is available. The other location of the activity is where the land is available on the banks of large canals. However marine fishing is concentrated at the coastal belt of Sind and Baluchistan.

Coverage

According to PSIC rev. 4 activity pertains to PSIC division 03, section A. It covers marine fishing and freshwater fishing. Included are the activities of aquaculture, marine as well as freshwater.

Data and sub-classification

The data, on regular basis, is being supplied by the Marine Fishery Department, Ministry of Livestock and Dairy Development, Government of Pakistan. Two studies have been conducted for the base year 2005-06 estimates, Study on Marine fishing and Study on Inland fishing. Studies are available on the website of FBS. These results, after discussing with the relevant departments and experts on the subject, have been adopted for the base year 2005-06. It is important to understand the activity before valuation. In marine fishing, crew is often paid a share of the value of landing. The landed fish is auctioned at the port. The fishermen directly pay the auctioneer or the auction hall for marketing their fish catch. Auctioneers or the auction hall have to pay some of this amount as a membership fee to the fishing cooperative society. The activities of the auctioneers belong to the PSIC, ‘other business activities’. Auction halls are to

be classified under PSIC wholesale and retail trade. Fishing cooperative society is to be classified under PSIC, 'other community, social and personal services'. In the previous base, the auction fees were treated as indirect taxes. In this base, the fees have been treated as intermediate consumption as well as output. In terms of the SNA output is the product of volume and price. Volume stands for quantity plus quality.
The estimation has been based on both, quantity as well quality. Different species have been valuated separately. The auction charges etc. have not been deducted from the output as indirect taxes but as intermediate consumption. The output in quantitative terms is 620.0 thousand metric tones having the value of Rs. 31001 millions. The unit value of output is Rs. 50.0 per Kg. Study on inland fishing to determine the parameters for the private fish farms is the source for contribution to gross output. Unit price (Rs. 80.0 per Kg.), i.e., average price per Kg. determined through this study is applied to the quantity reported by the department. The previous practice of assuming 100% under coverage is being continued.

Q.5 Discuss the water-logging and salinity problems in Pakistan. Also discuss the measurements taken by the government to solve these issues.

After a lifetime of tending his lands, a desperate Khudayar Khan has now started working as a daily wage labourer to make ends meet. His three-acre farm along the vast Indus river in Ghotki district of Pakistan's Sindh province has turned barren due to waterlogging and salinity.

"Repeated cultivation of rice and sugarcane on my land has resulted in waterlogging and I am left with no option but to start working as a labourer in a factory," he said.

His is not the only tale of ruin in the area, most of which is irrigated by the Indus, one of the longest rivers in Asia and a lifeline for millions of people in Pakistan.

Urging the government to initiate a programme to deal with growing waterlogging and salinity, Khan says the twin problems were destroying hundreds of acres of arable land each year. The excessive use of water for crops like rice and sugarcane has raised the groundwater table in Ghotki and some other adjoining districts.

Experts and studies back the farmer's claims. The excessive use of water for crops, non-cemented canals and a poor drainage system are causing waterlogging and salinity in the area.

"The entire left bank of the Indus river could turn into lakes of saline water in the next 10 to 15 years if timely action isn't initiated to curb waterlogging and salinity," warned Nabi Bukhsh, general secretary of the Sindh Chamber of Agriculture.

"Rice and sugarcane are the most water consuming crops and they ultimately raise groundwater table to a dangerous level," Bukhsh told thethirdpole.net. In his estimate, over 90% of farmers on the left bank of the Indus had been cultivating the two crops for the last three decades.

According to Bukhsh, farmers benefit from the crops initially but after some time, the excessive use of water turns fertile land barren and reduces yield.

He added that irrigation water seeps through the ground as all canals in the area are non-cemented and this ultimately results in waterlogging. “The stagnant water gradually turns saline and destroys nearby arable lands.”

The government has to do its bit to alleviate the problem. The water flow in the Kotri barrage, for instance, is hampered by silt and sludge. The authorities show little interest in dredging the drainage network in Sindh.

The government, Bukhsh added, should redesign the drain network to discharge fresh water into the sea. Besides, tubewells should be installed in the area to suck out water from the fertile lands.

According to a research paper, Salinity and Water-logging in the Indus Basin of Pakistan: Economic Loss to Agricultural Economy, around 43% of the area in the Indus Basin Irrigation System is classified as waterlogged with the water table at a depth of less than three metres, affecting around 7.1 million hectares of land.

A salinity survey conducted in 2001-03 by the Soil and Reclamation Directorate of the Water and Power Development Authority (WAPDA) showed that 27% of the area was salt affected.

The government of Sindh has recently banned rice cultivation in command areas of the canals on the left bank of the Indus to control waterlogging and salinity. A grower who violates the ban would be fined Rs.25,000 rupees ($246) per acre or with three years’ imprisonment. But a majority of farmers complain that the government ensures that the ban is imposed only on small growers.

The area where the rice cultivation is banned includes districts like Ghotki, Khairpur, Sanghar, Mirpur Khas and Tando Allah Yar.

Water logging and salinity

3. Water Logging and Salinity in Pakistan • Water logging represents the situation whereby the underground water comes on the surface of the land and in certain cases it gathers on the ground level of the lands and it may assume the shape of streams.

4. Water Logging and Salinity in Pakistan • As a result, the lands become uncultivable. In some cases, the underground water does not reach the upper level of lands but remains slightly lower and the land salts gather near the roots of the plants such situation is called Salinity. In this case, the sufficient amount of water is not available for irrigation, hence the salts are not absorbed in the land after having mixed.

5. Water Logging and Salinity in Pakistan • These salts gather in the form of a layer in the upper level of land. Thus due to water logging and salinity the water retains itself on the surface of land and salts gather themselves in the zones of roots of plants. This leads to decrease the efficiency and productivity of lands and finally lands become uncultivable.

6. Effected areas • The experts accord water logging and salinity as a major problem of agri. sector of Pakistan. According to an estimate the 50% of irrigated lands have been affected by water logging and salinity, while 30 lac acres of lands have become uncultivable.

7. Effected areas • Again, one lac acre of land is being affected by water logging and salinity each year. In case of Punjab, every year 70,000 acres of lands are being affected by water logging and salinity.
8. Effected areas • All those areas of lands which occur in Indus Basin system like Gujranwala, Shekupura, Faisalabad, Shapur, Jhang, Multan, Muzafar Garh and Khairpur have wrostly been affected by water logging and salinity.
9. Effect • Effect on farmer Because of water logging and salinity the agri. crops are being affected. As a result, the uncultivable area is increasing along with fall in incomes of farmers. They are becoming poor. According to a view that the water logging and salinity are becoming responsible for increasing rural inequalities.
10. Effect on farmer • As the farmers whose land are being affected by water logging and salinity' they are selling their lands to big farmers at the reduced prices. These big farmers, on the basis of their financial, political and social position, improve these affected lands. Consequently, they are becoming rich.
11. Effect on plants • crops need air (specifically, oxygen) to a greater or lesser depth in the soil. Water logging of the soil stops air getting in. How near the water table must be to the surface for the ground to be classed as waterlogged, varies with the purpose in view. A crop's demand for freedom from water logging may vary between seasons of the year, as with the growing of rice.
12. Effect on food • The water logging and salinity will result in food shortages due to fall in agri. production. As a result, agri. goods will have to be imported having a negative effect on our nation.
13. Effect on water • These two menaces are also resulting in environmental degradation as water logging and salinity are becoming responsible for water pollution.
14. Effect on road • The water logging and salinity are also affecting the means of transportation as it becomes difficult to construct the roads in the affected areas along with deterioration of existing roads etc.
15. Salinity • Salinity is the concentration of dissolved salts found in water. It is measured as the total amount of dissolved salts in parts per thousand (sometimes called PSU or Practical Salinity Units by scientists). Ten parts per thousand is equal to one percent.
16. salinity control • Soil salinity control relates to controlling the problem of soil salinity and reclaiming Stalinized agricultural land.
17. salinity control • The aim of soil salinity control is to prevent soil degradation by salivation and reclaim already salty (saline) soils. Soil reclamation is also called soil improvement, rehabilitation, remediation, recuperation, or amelioration.
18. salinity control • The primary man-made cause of Stalinization is irrigation. River water or groundwater used in irrigation contains salts, which remain behind in the soil after the water has evaporated.

19. salinity control The primary method of controlling soil salinity is to permit 10-20% of the irrigation water to leach the soil, be drained and discharged through an appropriate drainage system. The salt concentration of the drainage water is normally 5 to 10 times higher than that of the irrigation water, thus salt export matches salt import and it will not accumulate.
20. water logging • Water logging refers to the saturation of soil with water. Soil may be regarded as waterlogged when the water table of the groundwater is too high to conveniently permit an anticipated activity, like agriculture.
21. Control of water logging • Biological control A literature review was carried out on investigations from around the world into the effectiveness of biological drainage. The review covers the impact of different types of trees, bushes and crops on water table and the control of water logging.
22. Drainage • Drainage is usually the best way of reducing water logging. Other management options to reduce the impact of water logging include: choice of crop, seeding, fertilizer and weed control.
23. Choice of crop species • Some species of grains crop are more tolerant than others. Grain legumes and canola are generally more susceptible to water logging than cereals and fiber beans.
24. Choice of crop species • Crop damage is particularly severe if plants are waterlogged between germination and emergence. Plant first those paddocks that are susceptible to water logging. However, if water logging delays emergence and reduces cereal plant density to fewer than 50 plants/m2, reshow the crop.
25. Nitrogen fertilizer • Crops tolerate waterlogging better with a good nitrogen status before waterlogging occurs. Applying nitrogen at the end of a waterlogging period can be an advantage if nitrogen was applied at or shortly after seeding because it avoids loss by leaching or gentrification. However, nitrogen cannot usually be applied from vehicles when soils are wet, so consider aerial applications
26. Nitrogen fertilizer • If water logging is moderate (7–30 days water logging to the soil surface), then nitrogen application after water logging events when the crop is actively growing is recommended where basal nitrogen applications were 0– 50kg N/ha. However, if water logging is severe (greater than 30 days to the soil surface), then the benefits of nitrogen application after water logging are questionable.
27. Nitrogen fertilizer • But this recommendation requires verification in the field at a range of basal nitrogen applications using a selection of varieties.

COURSE: GEOGRAPHY OF PAKISTAN PART-I (4655)

SEMESTER: AUTUMN, 2019

ASSIGNMENT NO. 2

Q.1 Evaluate the role of agriculture in Pakistan regarding the growth and development of the economy.

"Agriculture is the of process of cultivation of land or soil for production purpose". Agriculture plays a very vital role for economy of Pakistan and its development. 48% of labour force is engaged directly with agriculture. So it is the main source of living or income of the major part of economy population. About 70% of population is relates to agriculture directly or indirectly. Agriculture is the major source of food of huge population of Pakistan. Agriculture is also the major source of provision of raw martial to industrial sector of Pakistan. Its contribution towards GDP is about 25% which is higher than contribution of any other sector. Following are the main points of importance of agriculture for Pakistan economy.

Source of employment:

Pakistan as developing economy the employment on consistent level has much importance. In this behalf agriculture has much importance because it provides employment directly or indirectly to the public. Employment directly affects the GSP of economy as well as the per capita income. With the increase in per capita income living standard increases, higher hygiene facilities & better education facilities are also increases. All these signs are the factors of economic development. So we can say that agriculture has a great contribution toward economic development by providing the employment.

Food requirement:

Population growth rate of Pakistan is increasing rapidly. According to UNDP human development report population growth rate of Pakistan is 2% per year. So with the rapidly increasing population the food requirement is also increasing rapidly. In this behalf agriculture is the only the major sector which is the meeting the increasing requirement of food. It also reduces the import of food from other economies. So we can say that agriculture sector is playing very vital role in development of Pakistan by providing the food for massive population as well as supporting the economic growth.

Contribution in exports:

Major exports or cash crops of Pakistan are wheat, rice and cotton. 9.8 billion Bales of cotton are produced per year. Rice crop is produced 4.3 million ton per year. These agricultural commodities are exported to various countries against foreign exchange. This foreign exchange is utilized for the import of industrial or technological equipments such as machinery or automobiles. Further this foreign exchange is utilized to improve the infrastructure of economy or for improving the other sector of economy like education, health and investments.

Raw material for industries:

Industries have great importance for the development of any country specially for developing economies like Pakistan. Industries need raw material to produce finish goods. In Pakistan

agriculture provides raw material to industries. Cotton is very important agricultural production which is also major export of Pakistan. It is used as raw material in textile industries. The production of these textile industries is exported to various countries against foreign exchange. Live stock is also an agricultural sector. It also plays very important role to export goods by providing the raw material to various industries like sports goods industries and leather industries. So in this way agriculture helps to Pakistan economy and its growth toward development.

Infrastructural development:

Infrastructure plays very important role to development of any economy. It is fuel to the economy development. Well organised infrastructure is a key to development because of quick means of transportation of agricultural goods or commodities (raw material or finish goods) and communication. On distribution purpose of agricultural products good and quick means of transportation are required this intends to improve the infrastructure rapidly. So agriculture play important role to the development of transportation for the purpose of distribution of goods.

Increase in GDP level:

Agriculture has huge contribution toward GDP of Pakistan economy. it contributes about 25% of total GDP, which is larger than other sectors of Pakistan. Increase in GDP shows the developing progress of the economy. It has played very important role since independence toward GDP of Pakistan. Now agriculture is the 3rd largest sector of contributing to GDP. Live stock and fisheries are the huge sector of agriculture in order to providing the employment. Employment contribute to GDP, it is as with the increase in employment the per capita income will increase which results to increase in GDP rate of the economy.

Decreasing in rural poverty:

Agriculture sector has played very important role in order to reduction of rural poverty. Since 1975 to 2000 the GDP growth rate of agriculture was about 4.1% per year. Green revolution technology in irrigation, improved seeds and fertilizers played very vital role to increase the agricultural production which results in increase in GDP. Through this technology farmers with land gain the opportunity to increase their production. So in this way arable lands became cultivated lands and farmers got the market of agricultural products against some return.

Development of banking sector:

Agriculture has also contributed a great role toward the development of banking sector. As the government realized the importance of agriculture, it takes steps to improve the productivity of crops by providing the credit facilities to the farmers at low interest rates. With utilizing these credits farmers can produce more and more crops. For this purpose government established the ZTBL and other financial institutes for the provision of credit facilities. So in this way development of banking sector takes place.

Farm mechanization:

Introduction of farm mechanization in agricultural sector had played very effective role in the development of economy. With the use of modern machinery in agricultural lands causes more and high quality production of crops. So the provision of raw material to the industries increases. Due to increase in productivity level the export rate of major export crops is increased which causes foreign exchange and economic development.

Use of Nanotechnology:

In agricultural sector use of modern technology like nanotechnology has played very vital role in the development of economy. This technology is used for producing the high yielding variety with high quality products. High quality products results into high rate of return to the farmers and the per capita income of farmer increases. Increase in per capita income shows the growth of economy toward development.

Role of dairy farming:

Dairy farming from agricultural sector has also played a great role in economic development. Livestock or dairy farming has huge contribution toward economic growth. The annual protein per capita is 18 kg of meat and 155 litters of milk. This is the highest rate in South Asia. Milk and meat and their by products have a good market. Farmers can receive a good return by producing and providing these products to the market. This process results into increase in per capita income as well as increase in national income of the economy.

Role of textile industries:

In economic development textile industries plays very important role. These industries totally depend on agriculture production in raw form. Cotton is the major crop which is used as raw material for these industries for production purpose. Further these products are exported to many economies against foreign exchange. So cotton as raw material from agriculture side contributes toward increase in NI (National Income). Textile industries also provide employment level which increases the per capita income of the person. So we can say that contribution of textile industries in the development of economy has much importance.

Role of sugar industries:

Sugar industry is also one of the major sectors of economy which has great importance according to development of economy. This is totally agricultural based industry. Sugar cane is produced on very large scale in many areas of Pakistan. This further supplies to sugar industries for the production of sugar and other by products which has great market. As large scale industries these also helps to provide employment level to the public. This results into increase in per capita income as well as improves living standards.

Rice Export Corporation:

Many areas of Pakistan have much importance according to the production of rice crop. In some areas the world most famous rice crop is produced. A huge quantity is exported to many economies against foreign exchange. This foreign exchange is further utilized in import of some

other products like modern technology or machinery or this is utilized for the improvement of infrastructure of the economy.

Role of fishery:

Fishing industry plays very important role in the development of national economy. With a coastline of 814 km Pakistan has enough resources for that remains to fully development. This is also the major export of Pakistan.

Forestry:

About 4% of land is covered with forests in Pakistan. This is the major source of paper, lumber, fuel wood, and latex medicine. It is also used for the purpose of wildlife conservation and ecotourism.

Measure to improve the efficiency of agricultural sector for development of economy:

Yield collection problems:

The collection of yield from small farmers is very expensive & difficult process. So it is a great problem of marketing. There should be some easy way for collection of yield from the farmers.

Rough grading Products:

Commodities or products which are graded have higher price in the market. In Pakistan mixing of poor & good qualities are common. So grading problems must reduce.

Storage problems:

The storage facilities in markets are not enough, seller can not store & wait for a higher price of the product due to lack of warehouses. Because of this some perishable produce suffers loss.

Middleman's role:

The middleman takes a big share of farmer crop without doing anything. The farmers borrow the money from them & sell their products at low prices. So this is a big loss to the farmers.

Transportation problems:

Our sources of transportation are insufficient, so regular supply of product is not possible to the market. The village are not properly linked to the markets. For proper provision of products to the market their must be sufficient as well as fast means of transportation.

Revenue system:

Our farmers have to pay land revenue after the harvesting of each crop, so it forces the farmers to sell their produce at low price.

Market Advisory Committee (MAC):

MAC (Market Advisory Committee) at district and tehsil level should be set up to provide technical advice and information to co-operative marketing societies. The officers of co-operative & agriculture department should be the members of the committee.

Market reforms:

The government should improve the markets system. Strict rules and laws should be introduced. The prices of agricultural products should be checked by the inspectors in the market.

Q.2 Keeping in view the soil formation, describe the following;

i) Indus basin soils

The Indus Basin comprises a vast area of alluvial plains deposited by the Indus and its tributaries, and a small area of loess plains. Most of the material is sub-recent or recent in origin, calcareous, and low in organic content. The soils cab en divided into three major categories: Bangar Soils (old alluvium); Khaddar Soils (new alluvium); and Indus Delta Soils. Bangar Soils cover a vast area in the Indus Plain, including most of the Punjab, Pewahwar, Mardan, Bannu and Kachhi plains, and the greater part of the Sind Plain. These soils are deep, calcareous, of medium to fine texture, low in organic matter, but very productive when irrigated and fertilized. In some ill-drained areas, these soils have become waterlogged, and capillary action has carried salts to the surface. Some areas show a puffy salt layer at the surface, but these can be reclaimed by simple leaching, if supplied with plenty of irrigation water. Over very small areas, strongly alkaline soil of patches have developed, and these, being non-porous are difficult to reclaim. In the Upper Chaj and Rechna Doabs, the submontane area bordering the Peshawar-Mardan Plain, and in the eastern Potwar, the Bangar soils have developed under sub-humid conditions. Because of the higher rainfall, they have been leached of lime and are non-calcareous, medium to fine textured, and have a slightly higher organic content. These soils are also fertile when supplied with plenty of water and manure. Khaddar soils are formed from recent and present-day deposits along the rivers. Part of these soils are flooded each year, adding depositional layers of silt loam and silty clay loam. The organic content of these soils is low, but they are usually free of salts. Indus Delta Soils are formed of sub-recent alluvium and estuarine deposits. They cover the entire area of the Indus Delta from south of Hyderabad to the coat. Clayey soils, developed under flood water conditions, cover about one-third of the area. With irrigation, these soils are used for rice cultivation. Saline loamy soils cover most of the delta. Some with salt crust at the surface, have been reclaimed by simple leaching and better drainage. Extremely saline patches can be used only for poor grazing. Coastal estuarine deposits form the lower part of the Delta, which is a maze of tidal flats, basins, and sea-water creeks. The soils are extremely saline and barren, except for a weedy vegetation.

ii) Mountain soils

Mountain soils occur in the highland areas of the north and west, and are residual as well as transported. Along the steep crests and slopes, and in the broken hill country, shallow residual soils have developed. Under arid and semi-arid conditions, these soils are usually strongly calcareous, with low organic content. Further north, under sub-humid conditions, there is more leaching, and a higher organic content.

In the mountain valleys, soils are formed from the alluvial infills of the streams. These soils are calcareous silt loams and sandy loams of low organic content. They are cultivated in patches only.

In the sub-montane area of the Potwar Plateau, shallow residual soils and silty eroded loess have been formed. In places these soils are massive, susceptible to erosion, and strongly gullied, producing a dissected landscape. Lime content is high, and organic content low, but, with plenty of water, these soils are relatively productive.

In the lowest parts of the inter-montane valleys and interior basins of the arid and semi-arid regions, strongly saline soils develop. Excess of evaporation over precipitation leaves a thick crust of salts at the surface of the intermittent lakes. For the most part, these soils are barren. The margins carry low shrubs and salt bush, used for poor grazing.

iii) Sandy desert soils

The soils extend over some parts of western Baluchistan, and the Cholistan and Thar Deserts. Thal desert soils occur in large sections of the Sind Sagar Doab. Desert soils include rolling to hilly sandy soils, and clayey flood plain soils. Where the soils are formed of deep sand, as in much of Baluchistan, they are moderately calcareous, and largely aeolian. In places, the windblown material is mixed with old alluvium. The arid and semi-arid desert sand areas have few possibilities for improvement, beyond very poor grazing.

Q.3 Describe the significance of the metallic minerals of Pakistan like copper, gold, silver, platinum, chromites, iron, lead and zinc?

After the Balochistan, the FATA and Khyber Pakhtunkhwa Province is richest in mineral resources. The Khyber Pakhtunkhwa and FATA host many metalogenic domains. The Hindukush-Karakoram block contains showing and deposits of antimony, arsenic, polymetallic sulphides, gold, radioactive minerals, sheelite, dolomite/ limestone/ marble, coal, graphite, and gemstones (aquamarine, topaz, tourmaline, ruby, spinel, pargasite, epidote, garnet, etc). The central part of arc is mainly Kohistan batholith which consists of gabbro, diorite and granodiorite. The southern part now called northern Indus Suture (Main Mantle Thrust/MMT) which represents obduction of the lower part of sequence with thick pile of thrust slices of ophiolitic (mafic and ultramafic) rocks. The northern part of Kohistan terrain show gossans and alteration zones associated with volcanic rocks all along the Karakoram Suture. It contains anomalous traces of copper, lead, zinc, antimony and gold. There are large vein type deposits of pyrite, stockworks of quartz veins containing disseminated grains of galena, sphalerite, chalcopyrite, arsenopyrite, azurite, bornite, chrysocolla, malachite, pyrrhotite, etc. There are several showings of massive magnetite or magnetite disseminated in amphibolites, deposits of chromite, showing of platinum, small deposits of fluorite, realgar and orpiment (antimony), showings of graphite, mica and talc. Northern Indus Suture is characterized by showings and deposits of asbestos, chromite, serpentine, iron, peridot, emerald, magnesite, talc, soapstone and platinum group of minerals associated with gold. Western Indus Suture contains showing and deposits of asbestos, chromite, copper, fluorite, iron, lead-zinc, magnesite, manganese, soapstone and talc, nickel, platinum and serpentine. The high metamorphic Khyber-Hazara Zone contains beryl, feldspar, fluorite, galena, garnet, graphite, magnetite, magnesite, marble, quartz,

sheelite, talc and gemstones. The gemstones include aquamarine, moonstone, pink topaz, peridot, ruby, spessartine, garnet and tourmaline. The low metamorphic Khyber-Hazara Zone contains phosphate, soapstone, marble, quartzite, gypsum, iron, manganese, coal, etc. The southern part of Khyber Pakhtunkhwa and FATA includes the Sulaiman Basin, Kohat Sub-Basin and interfingering of Sulaiman Basin with Kohat Sub-Basin contains bauxite/laterite, bentonite, clays, coal, fuller's earth, fire clay, glass sand, gypsum and anhydrite, iron ore, ochre, lead-zinc ores, manganese, limestone/dolomite, shale and sandstone, gravel, oil and gas, oil shale, potash salts, radioactive minerals, phosphate, rock salt and sulphur.

Q.4 Elaborate the role of rivers, canals and Karez in the irrigation system in Pakistan.

The irrigation potential of land and water resources is estimated to be equal to the cultivable area, or 21.3 million ha. In 2008, the area equipped for irrigation was around19.99 million ha, compared with 15.73 million ha in 1990. The total water managed area is an estimated 21.24 million ha, compared with 16.96 million ha in 1990, and can be divided according to the following classification (Table 4):

- Full control irrigation schemes cover 19.27 million ha, of which 14.87 million ha within the IBIS and 4.40 million ha outside the IBIS. The areas outside the IBIS cover minor perennial irrigation schemes, groundwater schemes including tubwells, wells, karezes and springs. They are located in Khyber Pakhtunkhwa and Balochistan. In Khyber Pakhtunkhwa irrigation is carried out using pump lifts, which are maintained by the Provincial Irrigation Department (PID). In the northern parts of Khyber Pakhtunkhwa contour channels are used to irrigate, offtaking water from the locally available sources, which are often steep sided streams or springs. Most of these schemes are owned and operated directly by the beneficiaries through traditional social organizations. In Balochistan irrigation water is taken from karezes and perennial springs. (Karezes are tunnels or underground channel that tap an aquifer). Irrigation schemes are generally small, ranging between 50 and 400 ha, and operated by a group. . Some small, group-operated schemes, are irrigated from infiltration galleries or small weirs in rivers and individuals may pump water from tubewells and open wells.
- Spate irrigation in 2004 covered a total potential area of 2 million ha (1.4 million ha in 1990). This area refers to potential spate area, but actual area varies based on flood occurrence and frequency and is around 0.72 million ha in an average year. In Pakistan, these areas are known as Rod Kohi in Khyber Pakhtunkhwa and Punjab, or Bandat in Balochistan, and the irrigation method is often called flood irrigation. The streams on the Makran coast and the Karan closed basin are flashy in nature and do not have a perennial supply, thus about 25 percent of their flow, which is less than 5 km3, is used for spate irrigation. This kind of irrigation relies on floods from hill torrents. Wherever

possible, the runoff is harnessed for irrigation by weirs or temporary diversion structures. Farmers divert the spate flow onto their fields by constructing breachable earth bunds (called gandas) across the rivers, or by constructing stone/gravel spurs leading towards the centre of the river. Captured water flows from field-to-field and, when the soil profile is saturated, the lower bund is breached to release water into another field. Annual average cropping intensity is 20 percent.

- Flood recession cropping areas cover 1.25 million ha on 2004 (1.23 million ha in 1990). In Pakistan these areas are known as Sailaba, and are often called falling flood irrigation areas. Sailaba cultivation is carried out on extensive tracts of land along the rivers and hill streams subject to annual inundation. Moisture retained in the root zone is utilized after the flood subsides together with subirrigation resulting from the capillary rise of groundwater and any rain.
- Apart form these water managed areas, some attempts have been made to develop water harvesting, which is known in Pakistan as Khushkaba, though it is not possible to quantify this area.
- In 2008, out of the 19.27 million ha of full control irrigation schemes, 6.91 million ha were commanded by surface water (canals), 4.13 million ha by groundwater (wells, tubewells), whereas 7.96 million ha were commanded by both surface water and groundwater. Only 0.27 million ha were commanded by non-conventional sources of water (Figure 3). Surface irrigation is the only irrigation technique used. In 2008, the entire area equipped for full control irrigation was actually irrigated.
- Although irrigation takes place in other areas of Pakistan, information on the history and development of irrigation generally refers to the IBIS, where more than 95 percent of the irrigation is located.
- The 4 000 year old Indus civilization has its roots in irrigated agriculture. Canal irrigation development began in 1859 with the completion of the Upper Bari Doab Canal (UBDC) from Madhopur headworks (now in India) on Ravi river. Until that time, irrigation was undertaken through a network of inundation canals, which were functional only during periods of high river flow. These provided water for Kharif (summer) crops and residual soil moisture for Rabi (winter) crops. The last inundation canals were connected to weir-controlled supplies in 1962 with the completion of the Guddu barrage on Indus river (barrages in the IBIS are constructed to divert river water into canals and the storage capacity is insignificant).
- UBDC was followed by Sirhind canal from Rupar headworks on Sutlej in 1872 (also in India) and Sidhnai canal from Sidhnai barrage on Ravi in 1886. The Lower Chenab from Khanki on Chenab in 1892, and Lower Jhelum from Rasul on Jhelum in 1901 followed. Lower and Upper Swat, Kabul river and Paharpur canals in Khyber Pakhtunkhwa were completed during 1885 to 1914.

- In the beginning of the 1900s, it became apparent that the water resources of the individual rivers were not in proportion to the potential irrigable lands. Ravi river, serving a large area of Bari Doab, was low in supply while Jhelum had a surplus. An innovative solution was developed in the form of the Triple Canal Project, constructed during 1907-1915. The project linked the Jhelum, Chenab and Ravi rivers, allowing a transfer of surplus Jhelum and Chenab water to the Ravi. The Triple Canal Project was a land-mark in integrated inter-basin water resources management and provided the key concept for the resolution of the Indus waters dispute between India and Pakistan in 1960.
- The Sutlej Valley Project, comprising four barrages and two canals, was completed in 1933. This resulted in the development of the unregulated flow resources of the Sutlej river and motivated planning for the Bhakra reservoir (now in India). During the same period, the Sukkur barrage and its system of seven canals, serving 2.95 million ha in the Lower Indus, were completed. These are considered to be the first modern hydraulic structures on the downstream Indus river. Haveli and Rangpur from Trimmu headworks on Chenab in 1939 and Thal canal from Kalabagh headworks on the Indus were completed in 1947. This comprised the system inherited by Pakistan at the time of its creation in 1947.
- At independence, the irrigation system, conceived originally as a whole, was divided between India and Pakistan without considering the irrigated boundaries. This resulted in the creation of an international water dispute in 1948, which was finally resolved by the enforcement of the Indus Water Treaty in 1960 under the aegis of the World Bank. The Indus Basin Project (IBP) including Mangla dam, five barrages, one syphon and eight inter-river link canals, was completed during 1960-1971, while Tarbela dam started partial operation in 1975-1976.
- After the partition, Kotri, Taunsa and Guddu barrages were completed on the Indus river to provide controlled irrigation to areas previously served by inundation canals. The Taunsa barrage was completed in 1958 to divert water to two large areas on the left and right banks of the river. This made irrigated agriculture possible for about 1.18 million ha of arid landscape in Punjab province. Currently rehabilitation and modernization of the barrage is in progress. Also, three additional inter-river link canals were built prior to the initiation of the IBP.
- As a result of these extensive developments Pakistan now possesses the world's largest contiguous irrigation system. It commands 14.87 million ha (2008) and encompasses the Indus river and its tributaries including three large reservoirs (Tarbela, Mangla, and Chashma), 23 barrages/headworks/siphons, 12 inter-river link canals and 45 canals commands extending for 60 800 km with communal watercourses, farm channels, and field ditches covering another 1.6 million km to serve over 90 000 farmer-operated

watercourses. In the Indus system, river water is diverted by barrages and weirs into main canals and subsequently branch canals, distributaries and minors.

- The flow to the farm is delivered by over 107 000 watercourses, which are supplied through outlets (moghas) from the distributaries and minors. The mogha is designed to allow a discharge that self-adjusts to variations in the parent canal. Within the watercourse command (an area ranging from 80 to 280 ha), farmers receive water proportional to their land holding. The entire discharge of the watercourse is given to one farm for a specified period on a seven day rotation. The rotation schedule, called warabandi, is established by the Provincial Irrigation and Power Department, unless the farmers can reach a mutual agreement.

Q.5 Evaluate the contribution of dairy farming in the development of Pakistan's economy. How can we improve the dairy farming industry?

The livestock sector plays a vital role in the economies of many developing countries.It provides food or more specifically animal protein in human diets, income,employment and possibly foreign exchange. For low-income producers, livestock alsoserves as a store of wealth; provide draught power, and organic fertilizer for cropproduction as well as means of transport.Milk provides relatively quick returns for small-scale livestock keepers. It is abalanced nutritious food and is a key element in household food security.Smallholders produce the vast majority of milk in developing countries where demandis expected to increase by 25% by 2025. Dairy imports to developing countries haveincreased in value by 43% between 1998 and 2001. Informal market traders handleover 80% of milk consumed in developing countries. Two thirds of total world milk isproduced by Brazil, India, Pakistan, Poland, Russian Federation, USA, and 15 EUmember states. Developing countries produced one third of total world milkproduction in 2000 (216 million metric tones) and it is increasing. Various animalsincluding buffalos, cows, sheep and goats produce milk. Total world milk productionis dominated by cow‟s milk followed by buffalo, goat and sheep.There is a dearth of research and documentation regarding the dairy sector in Pakistan.No serious effort has been made to understand dynamics of this important sector. Itsimportance could be judged from the fact that in terms of market value, itscontribution to Gross Domestic Product (GDP) surpasses all the major crops.Pakistan is the fourth largest milk producer in the world. About a third of the totalmilk produced by the rural families flows out to urban consumers and processingindustries. In urban areas milk is available to common consumers in two ways: loose /unprocessed milk and packed/ processed milk.

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In Pakistan only 3-4% of the total milk is processed and marketed through formalchannels whereas the remaining 97% of the milk reaches end users for immediateconsumption through an extensive, multi-layered distribution system of middlemen.However the processed milk consumption is growing at the rate of 20% per year.Pasteurized and UHT milk in tetra packs are very popular products.Large dairy shops also produce Desighee and butter. Processing plants have alsointroduced a number of dairy products like yogurt, drinking yogurt, flavored milk,cream, butter, ghee, cheese, ice cream etc. The quantities sold however are smallexcept for yogurt & butter. Industrial processing units in addition to the traditionaltraders of sweetmeats, milk, yogurt, ghee and other dairy products have been set-up.Most of processing capacity is concentrated near larger markets and away frompotential sources of milk. More than 53 modern milk processing facilities wereestablished before 1974. By 1974 less than half were operating and after theintroduction of the first UHT, long-life milk plant came into operation.Milk Production System in PakistanThe average farm gate price of milk is Rs 10 per liter. It varies from Rs 8 to Rs 16 perliter. Variation of farm gate price is not linked to the quality of the milk. It is ratherdetermined by two factors. One is the financial arrangement between the buyer andseller. The second factor is the geographical location. In areas where livestock rearingis difficult due to very hot weather or scarcity of fodder like in Rawalpindi, farmersget a better price for their milk. But when the price of the fodder is taken into account,the net income of these farmers is not significantly higher than the income of farmersfrom other areas of Punjab. Currently, there are no policies to regulate milk prices atthe farm level. The middlemen, contractors, Gawalas (local milk collection,transportation, and distribution people) processors, processed unpacked milk, loosemilk, and processed milk are the segments of the dairy value chain. The processedpacked milk costs Rs. 35 per liter whereas the loose milk costs Rs 24 per liter.Around a third of the total milk produced by the rural families flows out to urbanconsumers and processing industries. More than half of the milk collected by urbantraders and processing industries comes from small herd families.

Agriculture not only contributed importantly to the nationalGDP of Pakistan duringlast five decades but also the provision of employment and food to rapidly growingnation remains important obligations of this sector. In the changing scenario ofeconomy of Pakistan and other developing nations, agriculture is still the largestsector. InPakistan, agriculture contributes slightly above 25% to GDP, employsaround 44% of work force, is the main source of foreign exchange earnings andprovides linkagesthrough which it can stimulate growth in other sectors (EconomicSurvey of Pakistan, 1999-2000). Livestock is the most important sub sector ofagriculture in Pakistan that accounts for nearly 37% of agriculture value added andabout 9% of the GDP. The netforeign exchange earnings were about 35 billion rupeesin 1999-2000, which was about 9% of the overall export earnings of the country(Economic Survey of Pakistan,1999-2000). Livestock sector has its due importance

inPakistan due to the fact that 30-35 million rural population is engaged in livestockkeeping (Economic Survey, 1999-2000). Milk plays a tremendous role in building ahealthy society and can be used as vehicle for rural development, employment andslowing down the migration of the ruralpopulation. Pakistan stands 7th positionamong the top ten world‟s milk producing countries. Milk and milk products providenearly one third of world‟s intake of animal protein (FAO, 1998). This is not true forPakistan where milk provides more than half of the 17.4 g of animal protein availablefor each person daily and so traditional dietsassign a balancing role to milk(Anonymous, 1996). However, per capita availability of milk is far less than therecommended levels (0.5 liter per person per day) of WorldHealth Organization.About 80 thousand tones of dry milkwas imported in Pakistan during the last year tomeet local demands of milk (Agriculture Statistics, 1999-2000). The total milk yieldin Pakistan is 26.4 million tones and entiredairy processing industry was using onlyabout 15% of it (Hemani& Khan, 1997). The importance of milk as a cash crop isalways neglected in the past. While comparing thevalue of milk with other cash crops,it was mentioned that milk had a value about 60% higher as compared to both wheatand cotton together. The land of Pakistan is benefited with both irrigated plainsthrough mighty Indus river with its tributaries and desert areas like Cholistan.