

Water Resources

Students' Learning Outcomes

- Describe the surface and groundwater resources in Pakistan, including seasonal fluctuations in flow and quality of water.
- Evaluate the advantages and disadvantages of the extensive irrigation system in Pakistan and suggest sustainable solutions to water resource management in order to deal with threatening issues of water pollution, water shortage and wastage.
- Analyze the vital role of, dams, barrages, canals, and water reservoirs offer towards sustainable solutions, (including hydroelectric power generation, flood control, and irrigation,) and their potential impacts on the agriculture environment, industry and human activities.

The mentioned SLOs are further classified into knowledge and skills for the better understanding of students.



Knowledge

- ❑ Learn about eastern and western tributaries of the Indus River system.
- ❑ Understand the irrigation system of Pakistan.
- ❑ Discuss the canal system in Pakistan.
- ❑ Explore the small and big dams in Pakistan.
- ❑ Know the role of dams, barrages, canals, and water reservoirs.
- ❑ Learn about water management systems.



Skills

- ❑ Mark tributaries of rivers in Pakistan.
- ❑ Locate the eastern and western tributaries of the River Indus and Balochistan's rivers on the map of Pakistan, while recognizing the significance of these rivers for the country's inhabitants.
- ❑ Discuss uses and importance of rivers.
- ❑ Review the various domestic and industrial uses of water.
- ❑ Identify the components and uses of the irrigation system.
- ❑ Compare different types of irrigation systems.
- ❑ Enumerate and label the dams in Pakistan on a map.
- ❑ Differentiate between small and large dams.
- ❑ Justify, smaller dams are more beneficial than large dams by commenting on their advantages and disadvantages.
- ❑ Elaborate the causes, effects and ways of management of silt in dams. (e.g. desiltation in Mangla Dam)
- ❑ Discuss the barrages in Pakistan and their impact on agriculture of Pakistan.
- ❑ Analyze the advantages offered by dams, barrages, canals, and water reservoirs, including hydroelectric power generation, flood control, afforestation and irrigation.
- ❑ Examine the potential impacts of dams, barrages, canals, and water reservoirs on the environment and society.
- ❑ Assess the sustainability of the use of dams, barrages, canals, and water reservoirs for water management.
- ❑ Develop recommendations for the sustainable management of dams, barrages, canals, and water reservoirs for water supply in agriculture and industry.
- ❑ Suggest sustainable solutions to water scarcity / shortage and wastage issues.

Knowledge 5.1 Water Resources in Pakistan

Pakistan, located in South Asia, is a country of significant geostrategic importance due to its extensive water resources. It is nestled between India to the east, Afghanistan and Iran to the west, China to the north, and the Arabian Sea to the south. The country's water resources play a vital role in supporting its agriculture, industry and overall livelihood, making them a crucial aspect of Pakistan's socioeconomic development and stability. Pakistan possesses two significant water resource categories, which are elaborated below:

Surface Water Resources of Pakistan

Surface water resources refer to water bodies that are above the ground, such as rivers, lakes, canals and reservoirs. These resources are essential for various purposes, including irrigation, drinking water supply, industrial use and hydropower generation. In Pakistan, major surface water resources include the Indus River and its tributaries, such as the Jhelum, Chenab Ravi and Sutlej. These rivers flow through the country and are the primary source of water for agriculture, particularly in the Indus Basin.

Indus River system and its tributaries

The Indus River system, located in South Asia, is one of the world's most vital river systems, known for its historical, cultural and ecological significance. It originates from a glacier in Bokhar Chu, found in the Tibetan area, at a high elevation of 4,164 meters, in the Kailash Mountain range close to Mansarovar Lake. This extensive river system traverses through multiple countries, primarily India and Pakistan, before draining into the Arabian Sea. These remarkable tributaries, each contributing to the Indus's overall flow, play a crucial role in sustaining the region's agriculture, water supply and socio-economic activities. The Indus River system is fed by various tributaries, both eastern and western. Here are the major eastern and western tributaries of the Indus River:

Eastern Tributaries

Jhelum River

The Jhelum River is one of the major eastern tributaries of the Indus River. It originates from the Indian-occupied territory of Jammu and Kashmir. It flows through the Jhelum Valley in Pakistan and merges with the Chenab River near the city of Jhang, Pakistan. The Jhelum River has been harnessed for hydropower generation and irrigation in the region.

Chenab River

The Chenab River is another significant eastern tributary of the



Developmental Activity

Provide students with maps of the Indus River system. Point out the main river and its trajectory. Identify and highlight the eastern and western tributaries on the map. Discuss the geographical features surrounding these tributaries.



Skill: 5.1

Discuss uses and importance of rivers. Skill sheet will be provided via QR code.



Teacher Note

Use survey of Pakistan maps or google maps for identification of rivers in Pakistan. Also help students in identifying canals, dams, headworks and barrages during the same activity and relate them all as important sources of water.

Indus. It originates in the Indian state of Himachal Pradesh. It flows through the Indian-occupied territory of Jammu and Kashmir before entering Pakistan. The Chenab eventually joins the Jhelum River and together, they flow into the Indus River.

Ravi River

The Ravi River is the smallest of the eastern tributaries of the Indus. It originates in the Indian state of Himachal Pradesh. It flows into the Chamba Valley in India and then enters Pakistan, where it merges with the Chenab River. Historically, the Ravi River has been important for irrigation in the region.

Beas River (Sutlej tributary)

The Beas River is a tributary of the Sutlej River and originates in the Himalayas in Himachal Pradesh, India. It flows through Indian-occupied territories and eventually merges with the Sutlej River.

Sutlej River

The Sutlej River originates in Tibet and flows through Himachal Pradesh and Punjab in India before entering Pakistan. It joins the Chenab River in Pakistan, and together, they flow into the Indus River.

Ghaggar-Hakra River (seasonal river)

The Ghaggar-Hakra River is a seasonal river that once flowed through parts of northwestern India and eastern Pakistan. It is now largely a dry riverbed but played a significant historical role in the region.

Soan River (seasonal river)

The Soan River is another seasonal river that flows through parts of northern India and eastern Pakistan. Like the Ghaggar-Hakra, it primarily carries water during the monsoon season and is relatively dry at other times.

Western Tributaries

Kabul River

The Kabul River is one of the major western tributaries of the Indus. It originates in the Hindu Kush

Mountains of Afghanistan. It enters Pakistan near the city of Attock and eventually joins the Indus River. The Kabul River is essential for irrigation and water supply in both Afghanistan and Pakistan.

Swat River

The River Swat originates in the Hindu Kush Mountains of Afghanistan. It flows into the Swat Valley and then enters Pakistan, where it joins the Kabul River. The Swat River is significant for the agricultural and water needs of the region.

Kurram River

The Kurram River originates in Afghanistan and flows into Pakistan. It is an essential tributary that eventually merges with the Indus River, contributing to the overall water resources in the region.

Gomal River

The Gomal River originates in Afghanistan and flows into Pakistan. It joins the Indus River and plays a role in sustaining agriculture and the local economy.

Tochi River

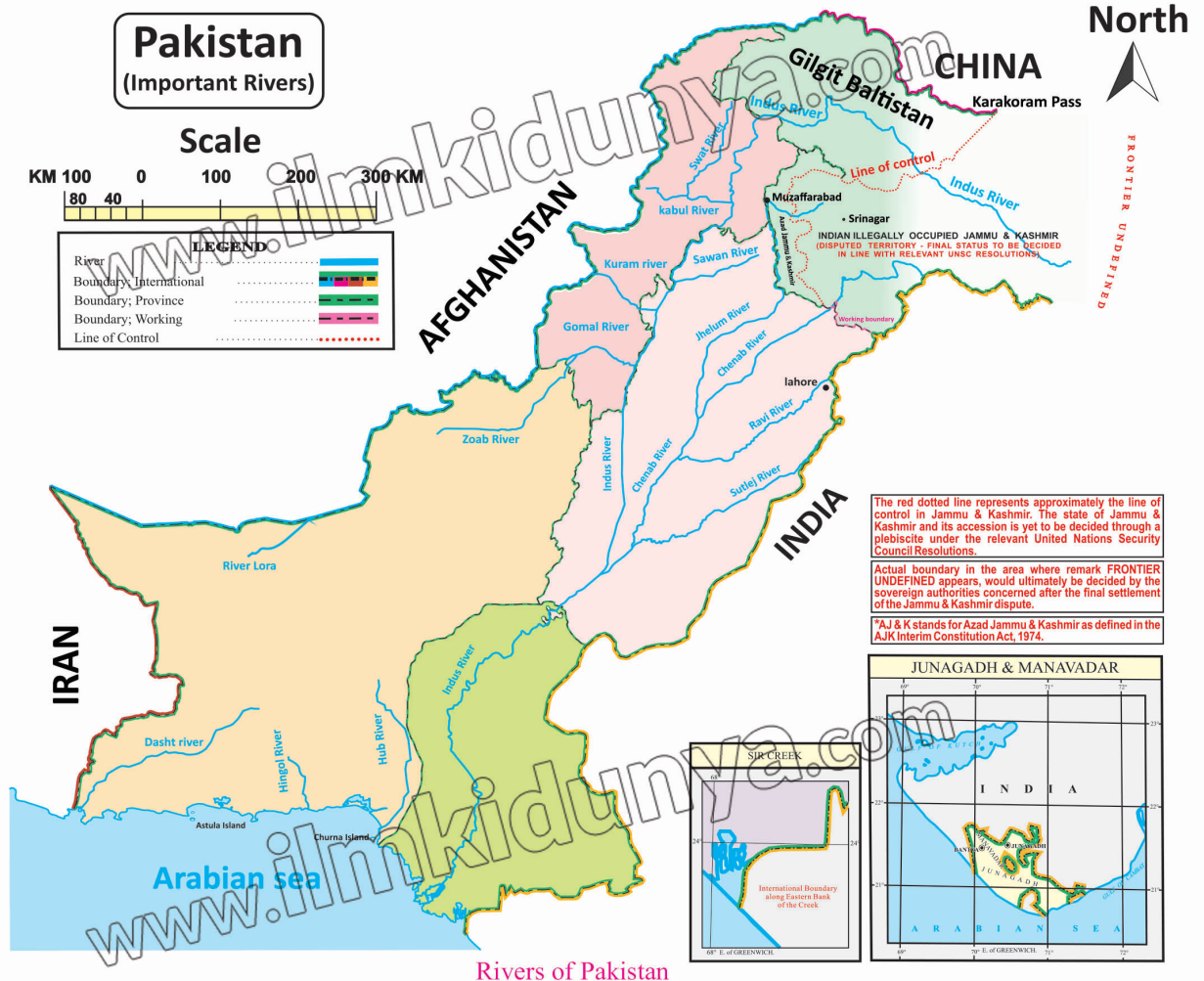
The Tochi River also originates in Afghanistan and enters Pakistan. It flows through the North Waziristan region and contributes to the water supply in the area.

Zhob River

The Zhob River originates in the Zhob Valley of Balochistan. It flows southwest and eventually joins the Gomal River.

Bolan River

The Bolan River is another river in Balochistan, Pakistan that flows



into the Indus system. It flows through the rugged Bolan Pass and is significant for the local population.

Hingol River

The Hingol River flows through the Hingol National Park in Balochistan. It enters the Arabian Sea and is an important river in this arid region.

Dasht River

The Dasht River flows in the arid region of Balochistan and eventually enters the Arabian Sea.

Kech River

The Kech River flows through the Kech Valley in Balochistan and enters the Arabian Sea. It serves as a vital water source for the region's agriculture.

Groundwater Resources of Pakistan

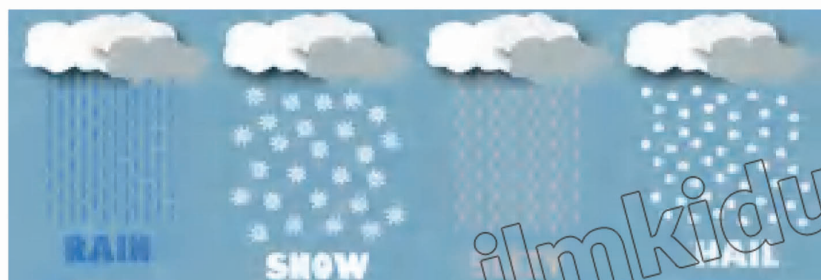
Groundwater resources pertain to water stored beneath the Earth's surface in underground aquifers. These aquifers are formed in geological formations and consist of water that has percolated down from surface sources over time. Groundwater is a crucial source of freshwater for domestic use, irrigation and industrial purposes, especially in areas where surface water is limited. The major groundwater aquifer in

Knowledge 5.2 Seasonal fluctuations in flow and quality of surface and ground water resources

Seasonal fluctuations in flow and quality of surface and groundwater resources are caused by a variety of factors, including:

Precipitation

Precipitation is the primary source of water for both surface and groundwater resources. During the rainy season, precipitation increases the flow of surface water bodies and recharges groundwater aquifers. During the dry season, precipitation decreases, which can lead to lower flows in surface water bodies and lower groundwater levels.



— Developmental Activity

Begin with a class discussion on the Indus River system. Assign groups to research and present information on the eastern and western tributaries.

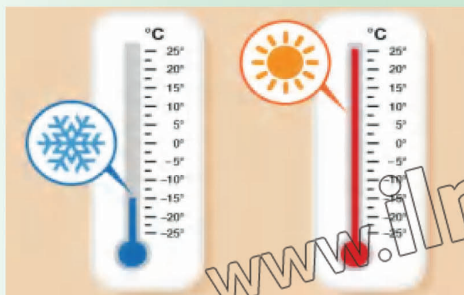


Skill: 5.2-5.4

🔗 Draw a timeline to show a Skill 1.2 Mark tributaries of rivers in Pakistan. Skill sheet will be provided via QR code.

🔗 Locate the eastern and western tributaries of the River Indus and Baluchistan's rivers on the map of Pakistan, while recognizing the significance of these rivers for the country's inhabitants. Constitutional development in British India from 1858 to 1935 and development of political parties. Skill sheet will be provided via QR code.

🔗 Review the various domestic and industrial uses of water. Skill sheet will be provided via QR code.



Temperature

Temperature

Temperature can also affect the flow and quality of water resources. During the summer months, higher temperatures can lead to increased evaporation from surface water bodies, which can reduce their flow and quality. Higher temperatures can also increase the demand for water, which can put additional stress on water resources.

Human activities

Human activities can also affect the flow and quality of water resources. For example, water withdrawals for irrigation, industry, and domestic use can reduce the flow of surface water bodies and groundwater aquifers. Pollution from agricultural and industrial activities can also degrade the quality of water resources.

Surface water resources

Flow: In temperate regions, surface water flows are typically highest in the spring and early summer, when snowmelt and rainfall recharge rivers and lakes. Flows are typically lowest in the late summer and fall when precipitation is lower and evaporation is higher.

Quality: Surface water quality can also fluctuate seasonally. For example, in agricultural areas, surface water quality can be degraded during the spring runoff period, when fertilizers and other agricultural chemicals are washed into rivers and lakes. In urban areas, surface water quality can be degraded during the rainy season, when storm sewers overflow and discharge untreated sewage into rivers and



Smoke from factories

lakes.

Groundwater resources

Flow: Groundwater flow rates are typically more stable than surface water flow rates, but they can still fluctuate seasonally. In areas with a rainy season, groundwater levels typically rise during the rainy season and fall during the dry season. In areas with a dry climate, groundwater levels may decline over time, especially if there is heavy pumping.

Quality: Groundwater quality can also fluctuate seasonally. For example, in areas with a rainy season, groundwater quality may be degraded during the rainy season when contaminants are leached into the aquifer from the surface. In areas with a dry climate, groundwater quality may be degraded by salinization, which occurs when salt water intrudes into the aquifer.



Teacher Note

Teachers can assign class presentations in groups. Different topics will be assigned to different groups, for example: domestic use of water, industrial use of water, irrigation system of Pakistan, dams of Pakistan.

Knowledge 5.3 Irrigation System of Pakistan

The irrigation system refers to the intricate network of canals, reservoirs and water management infrastructure that has been established to supply water for agricultural purposes. It is a fundamental component of the country's agricultural sector and plays a pivotal role in ensuring a consistent water supply for crop cultivation.

Pakistan has one of the largest and most complex irrigation systems in the world. It is essential to the country's agriculture sector, which accounts for over 20% of GDP and employs over 40% of the workforce.

The system is based on the Indus River and its tributaries, which provide over 90% of the country's water supply. The system includes three major storage reservoirs (Tarbela, Mangla, and Chashma), 19 barrages, and a network of over 60,000 kilometres of canals. This system is essential due to Pakistan's predominantly arid and semi-arid climate, where rainfall alone is often insufficient to meet the water needs of the agricultural sector.

Extensive Irrigation System

An extensive irrigation system, in the context of Pakistan, denotes an irrigation network that is both vast and comprehensive. It encompasses an extensive network of canals, barrages and dams designed to provide water for agricultural activities across a significant portion of the country's arable land. This system allows for multiple cropping seasons and the cultivation of diverse crops, significantly boosting agricultural productivity.

Advantages of Pakistan's Extensive Irrigation System

- The extensive irrigation system facilitates multiple cropping seasons, enhancing agricultural output and ensuring a stable food supply.
- It enables the cultivation of various crops, which contributes to economic diversity and food security.
- Agriculture is a major contributor to Pakistan's economy, generating employment and contributing substantially to the GDP.
- Reduced reliance on unpredictable monsoon rains decreases vulnerability to droughts and ensures a steady water supply for crops.
- Many of the dams and reservoirs within the irrigation system also serve as hydropower generation facilities, fulfilling part of the country's energy requirements.



Skill: 5.5

Identify the components and uses of the irrigation system. Skill sheet will be provided via QR code.



Skill: 5.6

Compare different types of irrigation systems. Skill sheet will be provided via QR code.



Project 1

Assign students to research the history, development and significance of the irrigation system in Pakistan.

Topics may include the role of major rivers, construction of barrages, and the impact on agriculture. Encourage the use of reliable sources and citations.

Similarly, assign students to research the canal system in Pakistan.

Topics may include major canals, their routes, the purpose they serve and notable projects.

Encourage students to explore both historical and contemporary aspects.

Instruct students to present their research on either the irrigation or canal system.

Facilitate a class discussion where students compare and contrast their findings on the irrigation and canal systems.

Disadvantages of Pakistan's Extensive Irrigation System

- Poor drainage management can lead to waterlogging and soil salinity, negatively affecting crop yields and soil fertility.
- Over-extraction of water from rivers and aquifers for irrigation has contributed to water scarcity, depleting precious groundwater reserves.
- The alteration of natural river flows and construction of dams disrupt ecosystems, impact fish migration and influence river sediment transport, posing ecological challenges.
- Disparities in water distribution can result in larger landowners having better access to irrigation, leaving smaller farmers struggling to secure their water rights.
- The extensive canal and dam network necessitates regular maintenance and rehabilitation, which can be costly and is occasionally neglected.
- The system encourages the cultivation of water-intensive crops, such as rice, which can lead to inefficient water use and strain water resources.
- Pumping water for irrigation consumes a substantial amount of energy, contributing to energy shortages and greenhouse gas emissions.

Knowledge 5.4 Canal system in Pakistan

The canal system in Pakistan is a vast and intricate network of artificial waterways that plays a pivotal role in the country's agriculture, particularly in the fertile Indus Basin. This canal system has its roots in the ancient Indus Valley Civilization, where advanced irrigation methods were employed over four millennia ago. Today, it primarily depends on the waters of the Indus River and its major tributaries, including the Jhelum, Chenab, Ravi, and Sutlej. To manage and distribute this water, Pakistan has constructed diversion weirs and barrages at various points along these rivers. These structures regulate the flow of water and channel it into an extensive network of canals and distributaries that crisscross the plains of Punjab and Sindh, providing water for irrigation.

The primary function of this canal system is to support agriculture, and it does so exceptionally well. It sustains Pakistan's agricultural sector, which contributes significantly to the national economy. The canals supply water to farmlands, enabling multiple cropping seasons and supporting a wide range of crops, including wheat, rice, cotton and sugarcane. However, the canal system faces challenges, including waterlogging, salinity and unequal water distribution.

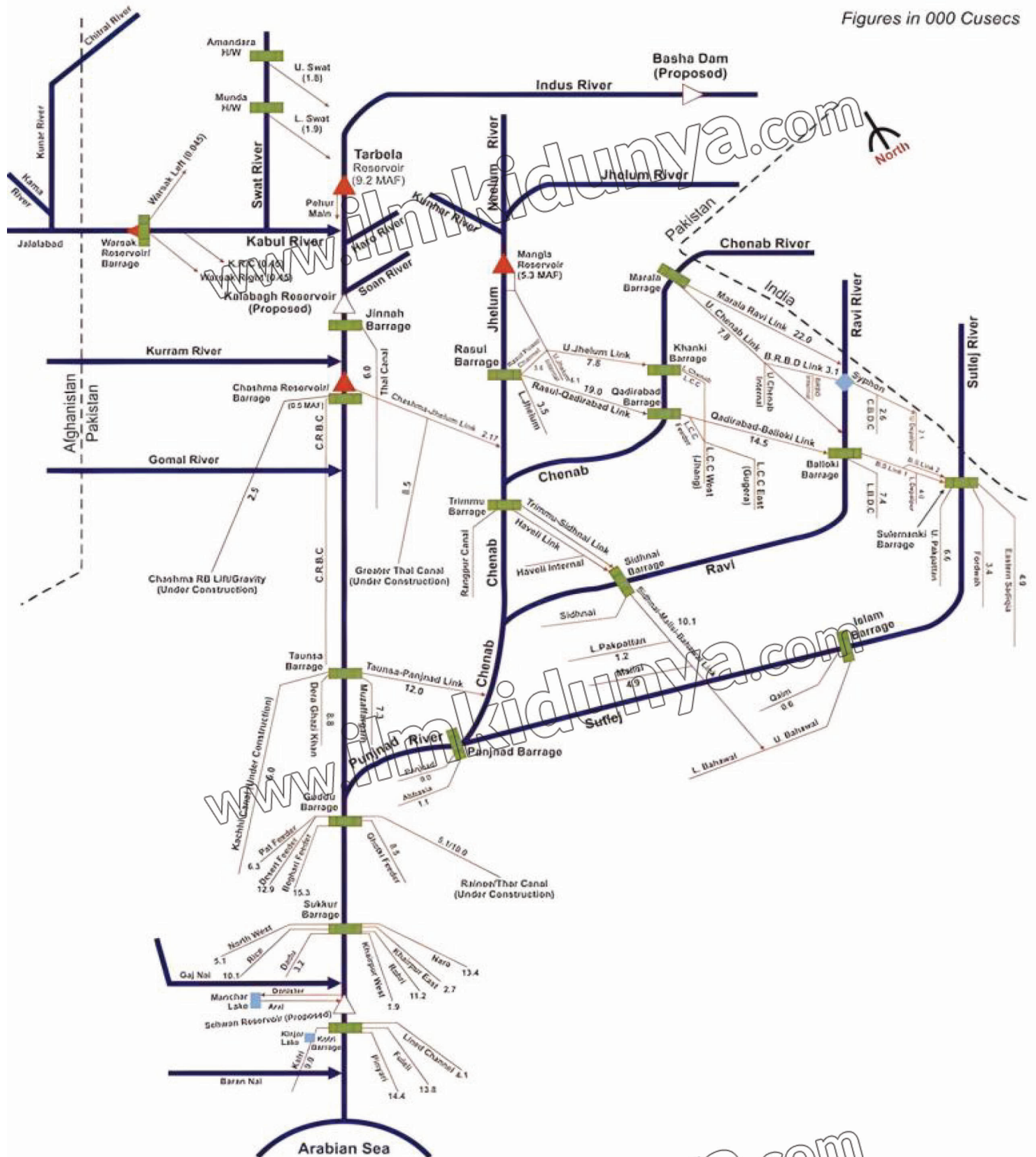
Over-irrigation has resulted in waterlogging and the accumulation of



Developmental Activity

Organize a class debate on the effectiveness of the canal system in Pakistan.

Encourage students to research and present arguments supporting or challenging its role.



Pakistan Canal System

Source: https://www.researchgate.net/figure/Schematic-map-of-the-irrigation-canal-network-of-Pakistan-Source-Stewart-et-al-179_fig1_354424748



Research and analysis

- Research the historical development of the canal system in Pakistan. Identify key milestones, events, and individuals involved in its establishment. Consider the impact of British colonial rule on the initiation of canal projects.
- Explore the major canal systems in Pakistan, such as the Indus Basin Irrigation System. Investigate how these systems are interconnected and how they contribute to the distribution of water for agriculture.
- Examine the impact of the canal system on agricultural practices in Pakistan. Investigate how the availability of water through canals has influenced crop patterns, yields, and overall agricultural productivity.
- Research the socio-economic implications of the canal system.
- Analyze how it has contributed to rural development, employment opportunities, and the overall well-being of communities along canal routes.
- Identify and discuss the challenges faced by the canal system in Pakistan.
- This could include issues related to water scarcity, maintenance of infrastructure, environmental concerns, and the impact of climate change.
- Investigate potential future developments and improvements in the canal system.
- Consider technological advancements, policy changes, and international collaborations that may contribute to the sustainability and efficiency of the canal system.
- Prepare a presentation summarizing key findings from the research. Include visuals such as maps, charts, and graphs to enhance understanding.



Developmental Activity

Students can be assigned topics of small dams and big dams to prepare speech in favour of their topic and points against others topic.

salts in the soil. Additionally, there are disparities in water distribution, with larger landowners having better access to water compared to smaller farmers.

In response to these challenges, Pakistan has launched efforts to modernize and rehabilitate the canal system. Investments have been made to enhance infrastructure, implement better water management practices and improve water-use efficiency. Moreover, many of the dams and barrages within the canal system also serve as hydropower generation facilities, contributing to Pakistan's energy needs while reducing greenhouse gas emissions. Nevertheless, the construction of canals, barrages and reservoirs has significant environmental impacts, such as changes in river flow, aquatic habitats and sediment transport. Proper ecological assessments and mitigation measures are necessary to minimize these impacts. The canal system, with its historical legacy and contemporary significance, underscores Pakistan's reliance on water resources for agriculture, economic development, and environmental sustainability.

Knowledge 5.5 Dams in Pakistan

Pakistan has a significant number of small and large dams, many of which play a crucial role in water storage, irrigation, hydropower generation, and flood control. Here are some notable large and small dams in Pakistan:

Large Dams

Tarbela Dam: Located on the Indus River in Khyber Pakhtunkhwa, Tarbela Dam is one of the largest earth-filled dams in the world. It primarily serves for water storage, irrigation, and hydropower generation. The Tarbela Reservoir is one of Pakistan's major water sources.

Mangla Dam: Situated on the Jhelum River in Azad Kashmir, Mangla Dam is another significant earth-filled dam. It provides water storage, irrigation, and hydropower generation. The dam has helped enhance agricultural productivity in the region.

Ghazi Barotha Hydropower Project: This project is located on the Indus River and consists of a run-of-the-river hydropower station. It contributes to Pakistan's electricity generation capacity.

Dasu Dam: Under construction on the Indus River in Khyber Pakhtunkhwa, the Dasu Dam is part of the Indus Basin Hydropower project. Once completed, it will have a substantial electricity generation capacity.

Diamer-Bhasha Dam: This under-construction mega-dam on the Indus River is expected to be one of the tallest dams in the world. It will provide water storage, hydropower generation, and irrigation

Small Dams

Hub Dam: Situated near Karachi in Sindh, the Hub Dam provides water storage and helps mitigate water scarcity in the region.

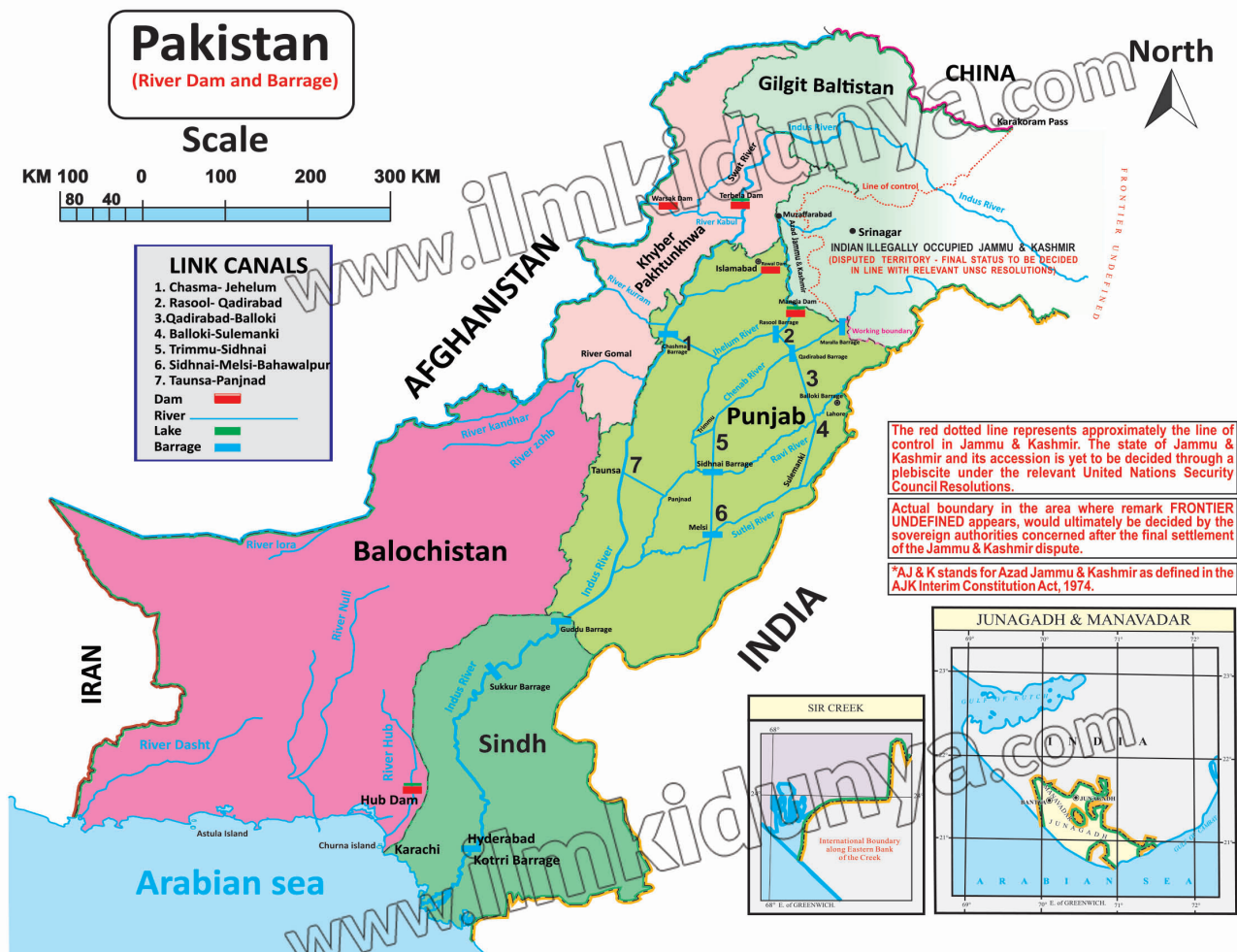
Shimshal Dam: In the Gilgit-Baltistan region, the Shimshal Dam provides water for local agricultural and domestic needs.

Kurram Tangi Dam: Located in North Waziristan, the Kurram Tangi Dam is essential for irrigation and water supply to the region.



Research and analysis

Divide the class into small groups and assign each group a specific dam in Pakistan. Instruct them to conduct research on the history, purpose and impact of their assigned dam. Each group presents their findings to the class. Facilitate a class discussion based on the group presentations. Encourage students to compare different dams, discuss their unique features and explore the benefits and challenges associated with each.



Dams, Barrage and Rivers of Pakistan

**Skill: 5.7-5.9**

- 🔍 Enumerate and label the dams in Pakistan on a map.
- 🔍 Differentiate between small and large dams.
- 🔍 Justify, smaller dams are more beneficial than large dams by commenting on their advantages and disadvantages. Skill sheet will be provided via QR code.

Neelum Jhelum Dam: The Neelum Jhelum Dam is a significant hydropower project located in Azad Jammu and Kashmir. It serves both hydropower generation and water management purposes.

These dams, both large and small, are vital to Pakistan's water resource management, agricultural development and electricity generation. They contribute significantly to the country's economic growth and the well-being of its people by addressing water storage, irrigation and energy needs. However, the construction and operation of dams also pose environmental and social challenges that require careful consideration and management.

Knowledge 5.6 Water Management System

A water management system refers to an organized approach that plans, develops and conserves water resources for various needs, aiming for efficient and sustainable water use in agriculture, industry, municipalities, energy generation and the environment.

Water Management Infrastructure

To facilitate effective water management, various structures are constructed for the storage and regulation of water. These structures, including dams, barrages, canals and water reservoirs, collectively form the essential components of 'water infrastructure' or 'water management infrastructure'.

Dams

Dams are formidable structures that play a multifaceted role in water resource management. They are primarily designed to store water, creating reservoirs behind them. These reservoirs serve as essential water storage facilities, enabling controlled release during periods of water scarcity, thereby ensuring a reliable water supply for agriculture, industry and municipal needs. Beyond water storage, dams often host hydropower plants. The gravitational force of water released from the reservoir turns turbines, generates electricity, provides clean energy and contributes to grid stability. Dams also serve as flood control mechanisms by regulating river flows during heavy rainfall, reducing the risk of downstream flooding. Additionally, many reservoirs created by dams offer recreational opportunities, from boating

and fishing to tourism, enhancing local economies and quality of life.

Barrages

Barrages are critical elements in the distribution of water resources. These structures are strategically positioned to control the flow of rivers and divert water into a network of canals and channels. One of their primary functions is to ensure equitable water distribution for agricultural, industrial and municipal purposes. Barrages can also

**Teacher Note**

Assign students roles in a mock water management team. Each group must propose a strategy for optimizing water resources in a particular region, considering the implementation of dams, barrages, canals, or reservoirs. This encourages critical thinking and problem-solving.

store water for regulated release, improving agricultural practices and sustaining ecosystems. Like dams, they play a role in flood control by managing river flows to minimize flood risks downstream. Barrages may also facilitate river navigation by maintaining consistent water levels to accommodate boats and ships.






Canals

Canals are essential for irrigation, transporting water from its source, whether a dam, barrage, or river, to farmland. Their primary function is to support agriculture, allowing controlled water distribution for crop cultivation. Canals ensure optimal soil moisture levels, enabling multiple cropping seasons and enhancing agricultural productivity. In addition to irrigation, some canals serve as vital transportation routes, particularly in areas with limited road infrastructure, improving connectivity and trade. Canals can also be utilized for drainage purposes, preventing waterlogging in fields during periods of excessive rainfall.

Water Reservoirs

Water reservoirs, whether natural or formed by human-made dams or barrages, serve as key storage facilities for water resources. These reservoirs offer numerous functions, including water storage for agricultural irrigation, industrial processes and municipal supply. They provide a consistent and reliable water source, helping regions maintain water security. Reservoirs can also serve recreational and environmental roles, offering opportunities for activities like boating, fishing and wildlife conservation. Moreover, by allowing sediment to settle, they contribute to water quality control, improving water treatment processes downstream. Many reservoirs also serve as hydropower sources, facilitating clean energy generation and reducing reliance on fossil fuels.

Skill: 5.11-5.14

-  Analyze the advantages offered by dams, barrages, canals, and water reservoirs, including hydroelectric power generation, flood control, afforestation and irrigation.
-  Examine the potential impacts of dams, barrages, canals, and water reservoirs on the environment and society.
-  Assess the sustainability of the use of dams, barrages, canals, and water reservoirs for water management.
-  Develop recommendations for the sustainable management of dams, barrages, canals, and water reservoirs for water supply in agriculture and industry.
-  Skill sheet will be provided via QR code.

Skill: 5.10

Discuss the barrages in Pakistan and their impact on agriculture of Pakistan. Skill sheet will be provided via QR code.

Developmental Activity

Provide students with maps of Pakistan, emphasizing key water infrastructure elements. Identify and discuss the locations of major dams, barrages, canals, and water reservoirs. Highlight the rivers associated with these structures.

Project 2

Divide the class into small groups and assign each group a specific water management system (watershed management, groundwater recharge, or wastewater treatment). Instruct them to design a concept map or diagram illustrating the components and processes of their assigned system. Each group presents their design to the class.

Exercise

A Choose the correct option against each statement.

- 1 What are the two major eastern tributaries of the Indus River system in Pakistan?
a. Jhelum and Chenab b. Kurram and Gomal
c. Kabul and Ganges d. Beas and Zohb
- 2 The irrigation system of Pakistan is primarily dependent on:
a. Monsoon rains b. Snowmelt from the Himalayas
c. River Indus d. Underground aquifers
- 3 What is the main purpose of small dams in Pakistan?
a. To generate electricity b. To provide recreational facilities
c. To control floods d. To store water for irrigation and domestic use
- 4 Which of the following is an example of a large dam in Pakistan?
a. Warsak Dam b. Khanpur Dam
c. Sabakzai Dam d. Kundal Dam
- 5 Which river does not significantly contribute to Pakistan's water resources?
a. Indus b. Jhelum
c. Nile d. Chenab
- 6 The term "barrage" in the context of water management typically refers to:
a. A small dam b. A flood control structure
c. A type of water purification plant d. A diversion structure on a river
- 7 What is the primary function of the Indus Basin Irrigation System in Pakistan?
a. To supply drinking water to major cities b. To generate hydroelectric power
c. To provide water for agriculture d. To control river flooding
- 8 Which small dam is located in the Swat district of Khyber Pakhtunkhwa?
a. Warsak Dam b. Mirani Dam
c. Tanda Dam d. Sabakzai Dam
- 9 How do barrages contribute to water management in Pakistan?
a. They store water for irrigation. b. They control river flow and distribute water.
c. They generate electricity. d. They protect against earthquakes.
- 10 How do large dams contribute to water management in Pakistan?
a. They control river flow and distribute water.
b. They generate electricity and supply drinking water.
c. They store water for irrigation and recreational activities.
d. They have no significant role in water management.

B Write brief answers of the following questions.

- 1 Name some of the eastern tributaries of the Indus River system?
- 2 Describe the canal system in Pakistan and its significance?
- 3 What are some examples of both small and large dams in Pakistan?
- 4 How does the irrigation system contribute to agriculture in Pakistan?
- 5 What are the primary functions of canals in Pakistan's water management?
- 6 Why are barrages essential components of the water management system in Pakistan?
- 7 Compare advantages and disadvantages of dams.

- 8 Enlist some dams in Pakistan.
- 9 Identify the industries related to the rivers and associated terrains.
- 10 Evaluate the future challenges and opportunities in Pakistan's water resource management.

C ➤ Write comprehensive answers of the following questions.

- 1 Suggest measures to deal with the challenges of water shortage and wastage.
- 2 Explain the distinct roles of dams, barrages, canals, and water reservoirs in Pakistan's water management.
- 3 Relate the location of main three dams of Pakistan with their catchment areas and watershed areas.

Pakistan Studies

9

“One Curriculum, One Nation”

قومی ترانہ

پاک سرزمین شاد باد کشورِ حسین شاد باد
 تو نشانِ غمِ عالی شان ارضِ پاکستان
 مرکزِ یقین شاد باد
 پاک سرزمین کا نظام قوتِ اخوتِ عوام
 قوم، ملک، سلطنت پائندہ تابندہ باد
 شاد باد منزلِ مُراد
 پرچمِ ستارہ و ہلال رہبرِ ترقی و کمال
 ترجمانِ ماضی شانِ حال جانِ استقبال
 سایہٴ خدائے ذوالجلال

(حفیظ جالندھری)

