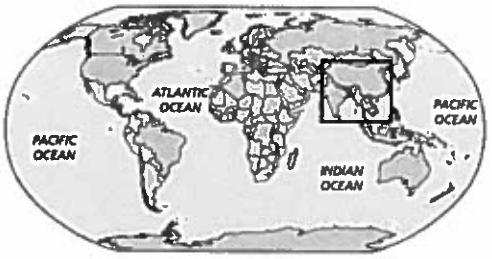
Resource security (1)

CASE STUDY

WATER SECURITY IN SOUTH ASIA, A NEXUS APPROACH

South Asia faces the challenge of providing sufficient water and energy to grow enough food for its expanding population. The Hindu Kush Himalayan (HKH) region is vital for the promotion of food, water and energy security downstream. The issues and challenges in the food, water and energy sectors are interrelated in many ways. Moreover, there is a high degree of dependency of downstream communities on upstream ecosystem services such as water for irrigation, HEP and drinking water.



Key indicators in water security in South Asia

Indicator	2007	2050 projection
Population (millions)	1520	2242
Annual population growth rate (%)	1.5	0.53
Population below US$1.25/day (million)	596	14.1
Irrigated area (million ha)	104	135
Total water consumption in agriculture (km^3)	1479	1922
Total water withdrawal for irrigation (km^3)	1095	1817

Key features of, and challenges for, water security in South Asia

Key characteristics	Adaptation challenges	Interface among nexus resources and adaptation to climate change
Growing water stress		
Growing water demand for agriculture, energy, industry and human and livestock use: annual water demand is predicted to increase by 55% compared with 2005.	Providing access to safe drinking water in the face of increasing increasing variability in the water supply.	Water-intensive adaptation prectices leading to increased water pollution and water-borne diseases, high child mortality, poor human health.
Upstream-downstream dependence on water		
High dependence of downstream communities on the upstream for water to grow food and generate hydropower.	Need for enhanced upstream-downstream coordination and cooperation for sustainable development of Hindu Kush Himalayan (HKH) water resources.	HKH rivers are the lifeline for dry season water for irrigation, hydropower and major economic activities.
Increasing dependence on groundwater for food production		
About 70–80% of agricultural production depends on groundwater irrigation.	Adapting to declining water tables.	Groundwater pumping for irrigation requires excessive energy, which further increases electricity demand.

CHECK YOUR UNDERSTANDING

13. Outline why demand for water in the Hindu Kush Himalayan region is increasing.
14. Explain briefly how increasing use of groundwater has an impact on the energy sector.

Resource security (2)

CASE STUDY

FOOD SECURITY IN SOUTH ASIA, A NEXUS APPROACH

South Asia has just 3 per cent of the world's land but around 25 per cent of the world's population. Thus, water and food security are vital. South Asian countries are home to 40 per cent of the world's poor population, and over half the population is food-energy deficient. Moreover, about 20 per cent of the population lack access to safe drinking water. Thus there are major challenges in providing food and water security to the South Asian population.

Key indicators related to agriculture security in South Asia

Indicator	2007	2050 projection
Population (millions)	1520	2242
Undernourished population (%)	21.8	4.2
Arable land (million ha)	204	213
Irrigated area (million ha)	104	135
Cultivated land (ha per person)	0.12	0.08
Agricutural growth rate (%)	2.4	1.3

Key features of, and challenges for, food security in South Asia

Key characteristics	Adaptation challenges	Interface among food, water and energy resources and adaptation to climate change
Huge chronically undernourished population		
About half of the world's poor (46%) and 35% of the world's undernourished live in South Asia.	Provision of food, water and energy to a large malnourished population without degrading the natural resource base and environment.	To meet the nutritional needs of all, food production to double in the next 25 years.
Burgeoning human population		
About 25% of the world's population) lives in just 3% of the world's land area.	To feed the growing population, agricultural production will have to increase by 70%.	Increased pressure on land, water and energy to meet demand.
Declining cropland		
Per capita arable land continually declining due to population growth, urbanization, and increasing biofuel cultivation to meet energy demand.	Limited option for growing more food grain by expanding crop area.	Competing demand for land for food, bio-energy production, and ecosystem services.
Intensive food production		
Food production becoming increasingly water- and energy-intensive.	Adapting to the declining groundwater table.	Agricultural growth is constrained due to shortage of enegy and water.
Changing food preferences towards meat		
The meat production process requirs more energy and water.	About 7 kg of grain equivalent is required to produce 1 kg of meat.	Increased pressure on water to meet the food requirement.
Sensitivity to climate change		
Food production is highly vulnerable to climate change due to rising temperatures, accelerated glacial melting, increased evapotranspiration, and erratic rainfall.	Uncertainty in water availability due to rapid glacier melt and changes in monsoon pattern in the Himalayas.	Climate change is likely to be a critical factor in increasing water and energy demand for food production and land demand for biofuel production.

CHECK YOUR UNDERSTANDING

15. Explain why South Asia has a major problem with food production.
16. Outline the reasons why arable land/head is declining in South Asia.

Resource security (3)

CASE STUDY

ENERGY SECURITY IN SOUTH ASIA, A NEXUS APPROACH

Just as food and water are essential for human existence, energy is key to human development. The nexus approach stresses the need for cooperation among the water, food and energy sectors, despite the competition for scarce resources. The ecosystem services provided by the Hindu Kush Himalayan (HKH) region are vital for the security of all three sectors.

Key characteristics and challenges for energy security in South Asia

Key characteristics	Adaptation challenges	Interface among food, water and energy resources and adaptation to climate change
High energy poverty		
About 63% of the population without access to electricity; 65% use biomass for cooking.	Providing adequate and reliable energy to a large population without increasing pollution.	Growing demand for water and land for energy production.
Under-utilised potential for hydropower and clean energy		
Hydropower in the Himalayas is limited in places due to the risk of causing landslides.	Adaptation options are restricted.	Energy diversification to meet the growing demand for food, water and economic growth.

The challenges that face South Asia include population growth, rapid urbanization, industrialization as well as the uncertainties of climate change. These changes are leading to increased demand for, and pressure on, resources. Most ecosystem services are used and managed at a variety of scales and by a variety of stakeholders, for example, farmers, politicians, industrialists, water engineers and urban populations.

The HKH is the source of water for hydroelectric power. However, the region is experiencing deforestation, land degradation, soil erosion, overgrazing and declining productivity. Soil erosion has led to an increase in the frequency and severity of flooding. Water quality and quantity are adversely affected by land-use changes. Without proper ecosystem management in the HKH, water, food and energy security are all at risk.

CASE STUDY

THE IMPACT OF LANDSLIDES IN NEPAL

In 2014 heavy rain caused a massive landslide from the hillside in Jure, in Nepal's central region. It created a high artificial dam across the Saptakoshi River, one of the main tributaries of the Koshi River, blocking the flow of water completely. Around 5,000 families were displaced and dozens of houses destroyed. It was the deadliest landslide in Nepal in a decade. The landslide also covered the main highway to China in mud and debris 20 metres deep, and blocked the Sun Koshi River roughly 80 km east of Kathmandu. Water quickly pooled behind the rubble, forming a lake that submerged a small hydropower station three kilometres upstream. The lake posed a flood risk for at least 400,000 people in two countries. The landslide damaged a hydroelectric power station downstream and cut electrical transmission lines along the valley. In all, nearly a tenth of the nation's hydroelectric capacity, some 67 megawatts, was severed, leading to power cuts in the capital and elsewhere in the country.

Nepal's undeveloped hydropower potential is second highest in the world, behind Brazil. Nepal's deep narrow canyons would be an ideal site for HEP, if it were not for monsoonal rain and the risk of landslides. Nepal's energy ministry set a goal in 2010 of building 37,000 megawatts of new hydropower capacity within 20 years. Heavy rain from 14 to 16 August, caused massive floods and several landslides in 18 districts throughout the country. It destroyed crops, contaminated water and once again cast doubts on whether Nepal should try to develop its HEP project, despite abundant raw materials.

COMMON MISTAKE

✗ *HEP does not have any negative environmental impacts.*

✓ Although HEP is a clean form of energy, it has negative environmental impacts. For example, it may increase the risk of landslides and earthquakes, it disturbs natural habitats, and much CO_2 is released during the construction of the dam.

CHECK YOUR UNDERSTANDING

17. Suggest reasons why access to biomass may be limited to many (poor) people in future.
18. Explain why it may be difficult for Nepal to develop its HEP potential.