A Sustainable Resource Future - Interconnection between Resources and Our Lives

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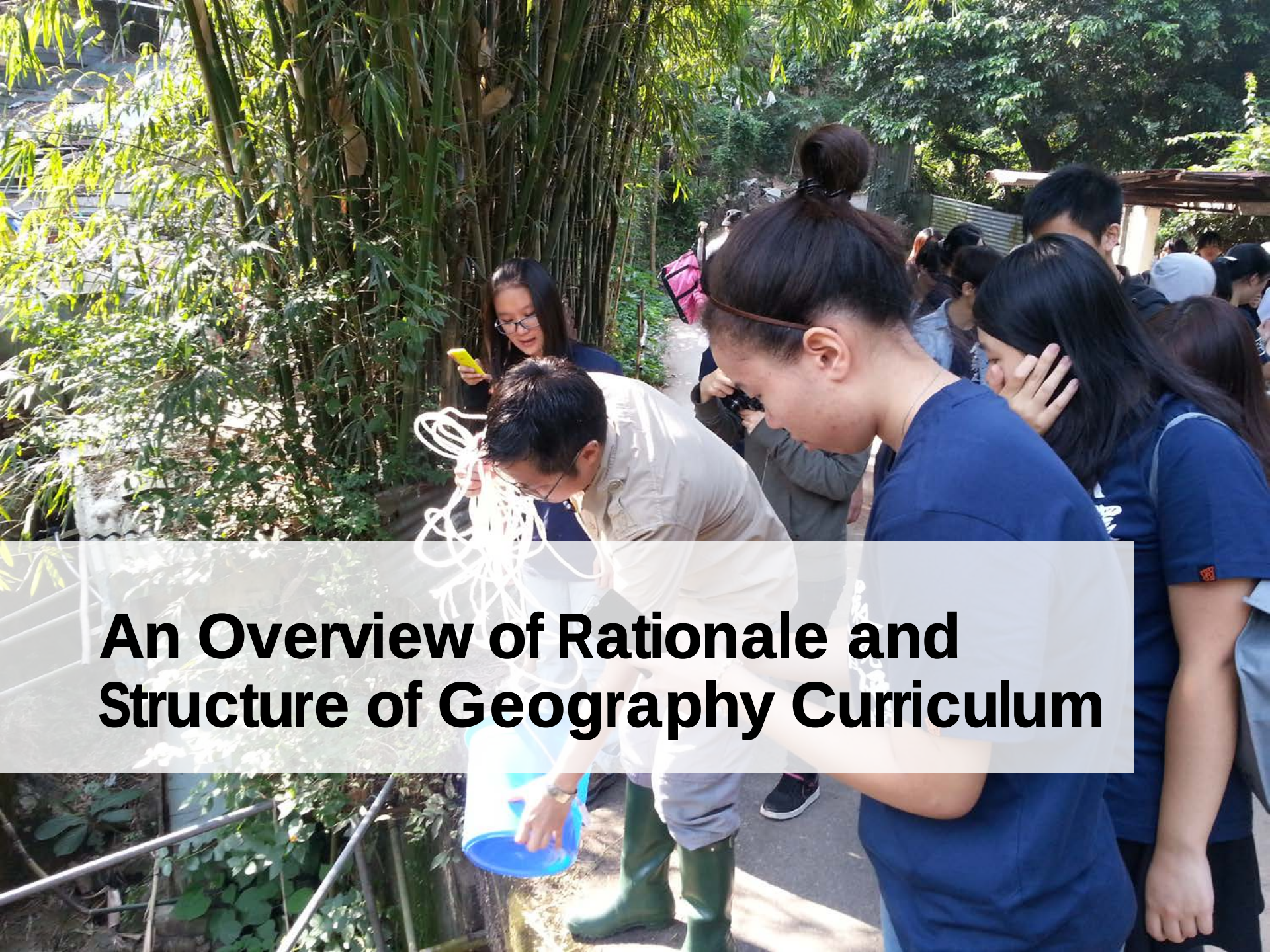
Agenda

1. An overview of Geography curriculum in HK
2. Local Water Problems
3. Deficiencies in Resources Management
4. Sustainable Education in formal curriculum



An Overview of Rationale and Structure of Geography Curriculum

S1-S3 Geography

RATIONALE

- To gain a better understanding of the **interaction between human and natural environments**
- Through the study of geography, student will be able to understand better how **local, national and global** issues could be resolved and managed in a **sustainable way**
- Help cultivate students' concern for and commitment to the betterment of our home city and our nation

AIMS

- To develop **knowledge of space, place and environment**, in particular the spatial arrangement of places and the interaction between human and the environment
- To be **informed and responsible citizens** who are willing to act for the betterment of their home city, home nation and the world, and to contribute to the **sustainable development** of human societies and the natural environment

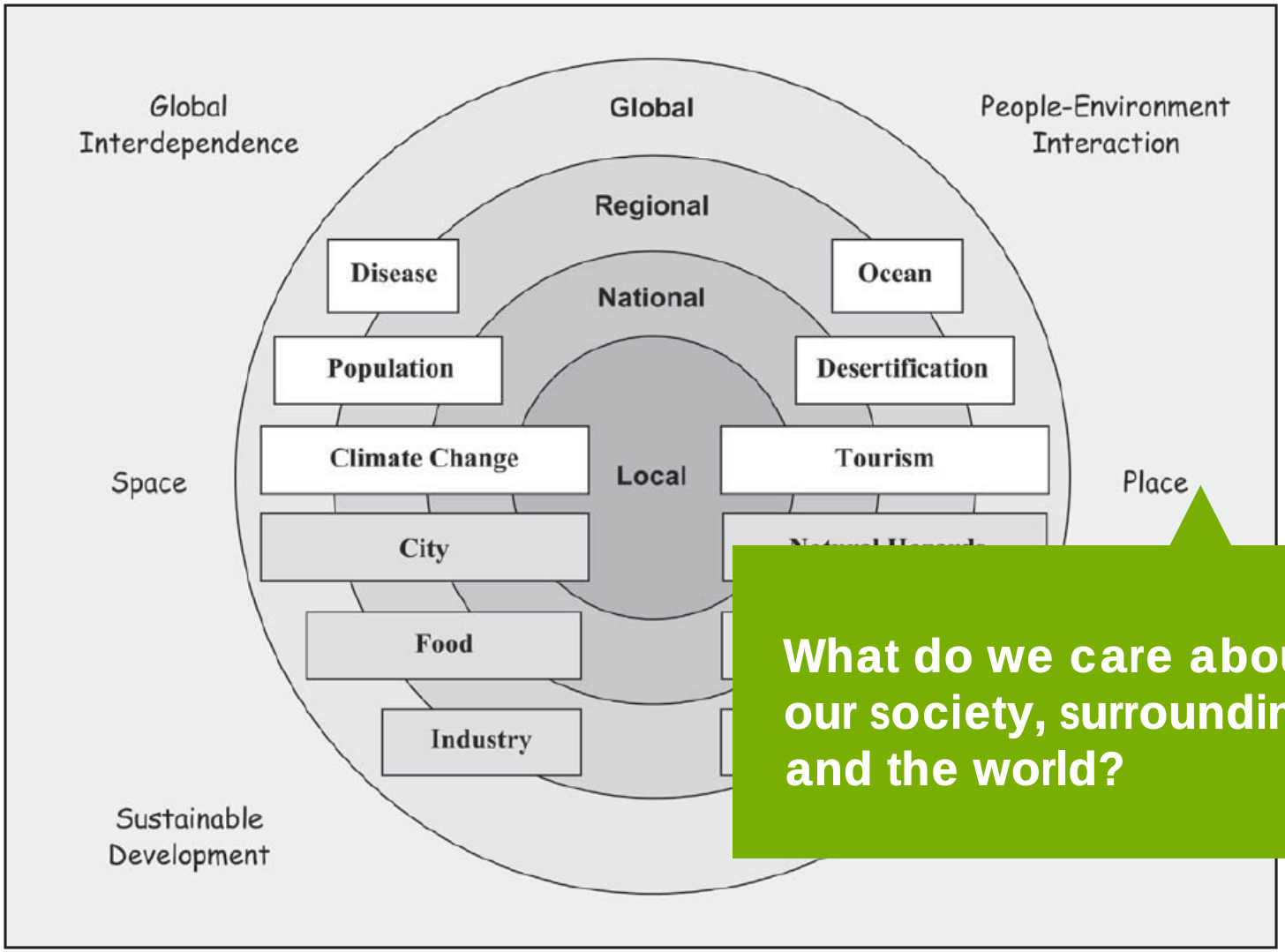
OBJECTIVES – KNOWLEDGE

- Develop understanding of key geographical concepts, including space, place, region, human-environment interaction, global interdependence and sustainable development, and apply them in new situations and contexts
- Understand how the natural environment influence human life and how human activities alter the natural environment
- Develop a knowledge of the major **global issues**, and how these issues can be **managed and/or resolved in a sustainable way**

OBJECTIVES – ATTITUDES

- Be commit to actions conducive to a **better environment and to the sustainability of the world**
- Develop **a sense of belonging** to our society and nation, and be willing to take action for the betterment of our society and nation

Curriculum Structure: Modules, key concepts and areal coverage



What do we care about our society, surroundings and the world?

(EDB, 2011)

S4-S6 Geography

RATIONALE

- Enables students to explore and understand the **relationship between human beings and the Earth** through the study of space, place and environment
- Develop knowledge of the **increasing challenges for our nation and the world** posed by natural hazards, environmental pollution, regional disparity, and resource depletion
- Use geographic knowledge and skills in solving problems and **apply spatial and ecological perspectives to life contexts**

AIMS

- Enable students to recognise and interpret our environment from a spatial perspective to the issues and management responses that arise;
- Develop the skills needed for lifelong learning through geographical enquiry, and the ability to apply these in life situations;
- Appreciate the **values** of local and global environment, and the importance of promoting sustainable development

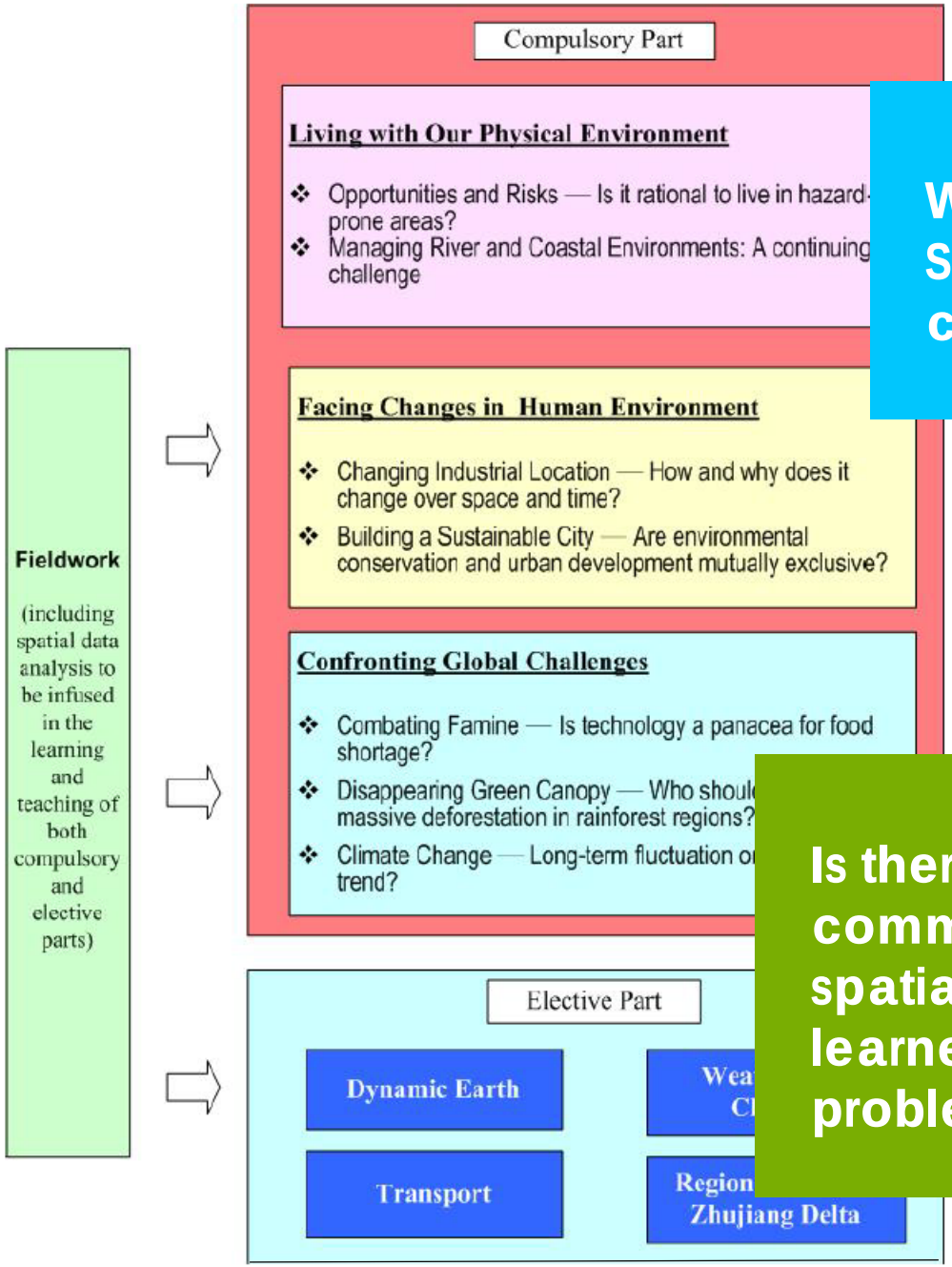
OBJECTIVES – KNOWLEDGE

- How natural environments and human activities **mutually influence** each other
- The characteristics and functioning of major natural environments; the changing development of geographical phenomena and issues in terms of space and time
- The issues arising from **people-environment interactions and the human responses** to such issues, as well as the implications of these human responses for **resource management**

OBJECTIVES – ATTITUDES

- Recognise environmental problems and **take appropriate action** to promote sustainable development
- Cultivate **a sense of belonging** to society and the nation and become active and responsible citizens

Tl ndary Geography



What are the bases of the Secondary Geography curricula in Hong Kong?

Is there any address to community needs by blending spatial dimension of GG with learner-centred needs in a problem-based framework?

(EDB, 2017)

Context of the issues covered in GG Curricula

Global Water Problem

Water Scarcity and Food Insecurity

Severe **water shortages** due to drought, economic development and changing lifestyle has seriously affected agricultures. There is a **decline of agricultural production**. This results in world food insecurity, social-economic problems such as forced migration, rural poverty, malnutrition and increase in food price, especially in the rural areas.

Regional Wate

China's Water Cri

- The issues display the adverse influence of people-nature interaction
- Challenges are posed to resources management
- How should human beings respond ?

Quality

Water pollution by development

Supply and Distribution

Water scarcity and uneven distribution of water

- **China's unique geomorphology**:
  - Climate varies (latitude)
  - Presence of rivers
  - Seasonal variation
  - Land use differences
  - Development level

Competitive use of water resources

- **Agriculture (62%) --> ~50% irrigation water is wasted**
- **Industries (22%)**
- **Domestic (14%)**
- **Ecosystem (2%)**

Local Water Problem

Urban Development in Hong Kong

	HK Geography C&A Guide
River Pollution 	**S1-S3: The Trouble of Water- Too much or Too little** o Water problems in China: o Uneven distribution of water o Flooding o Drought o Water pollution
River Channelization 	**S4-S6: Managing River and Coastal Environments** o River landscapes o Fluvial processes of river o River channelization o Human activities

Local Water Problem

Urban Development in Hong Kong

Rapid population growth, urbanization and human activities have contributed to two main problems of our surface water

SOURCE:

- Wastewater discharge
- Untreated urban sewage
- Non-point source pollution, e.g. illegal human activities
- Inadequacy of law enforcement

River Channelization

- Natural river is straightened for flood control

IMPACTS:

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River Pollution

What underlying principle(s) governs the ways how the water resources are perceived in the HK GG curricula?

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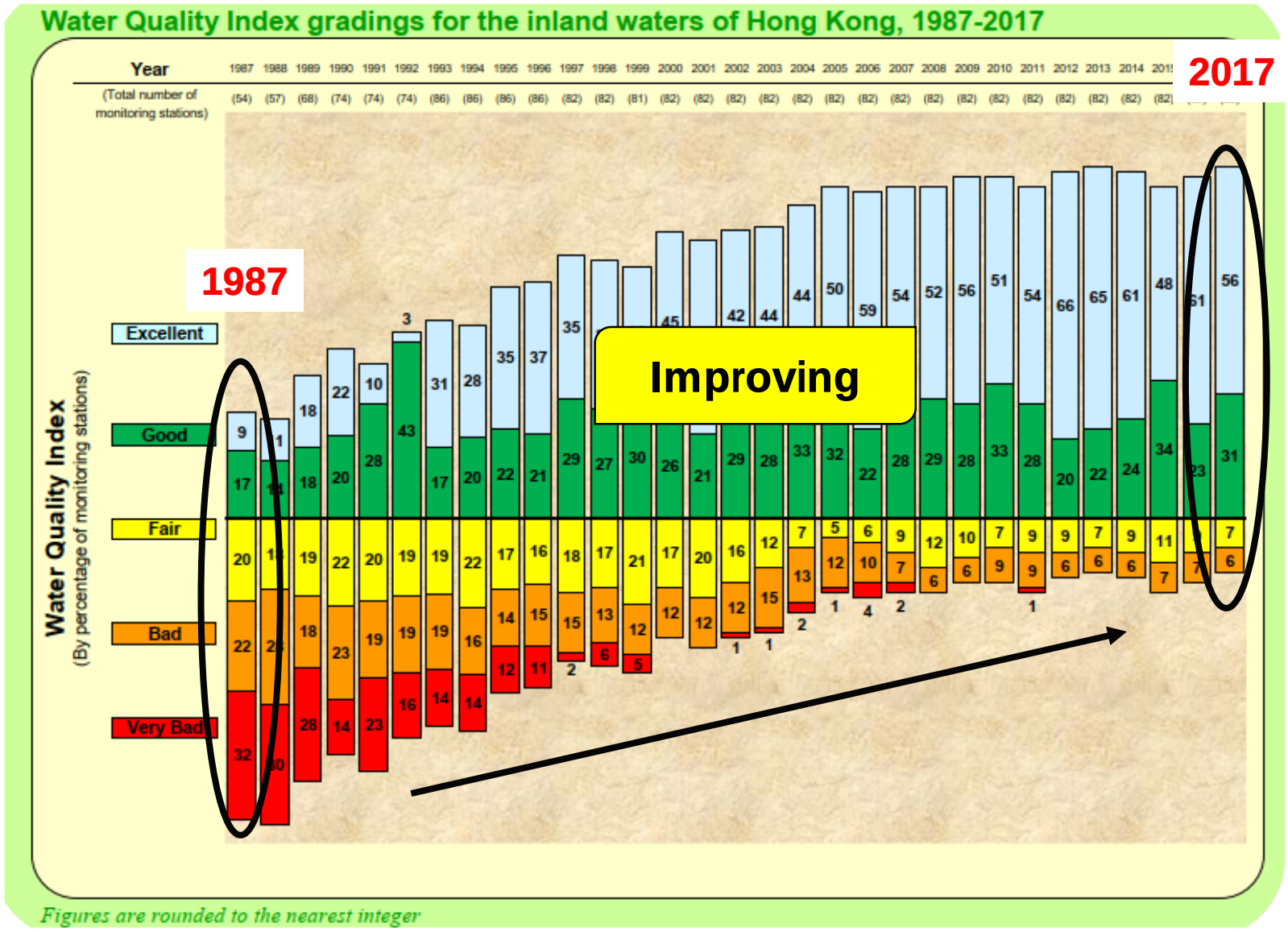
Deficiencies in Resources Management

Challenges in sustainable river management

River Water Quality



(EPD, 2017)

River Water Quality

FACT

- most of the rivers located in Northern and Western New Territories graded as **"Bad"** in water quality

REASONS

- **"Very High"** level of ***E.coli***
- **non-point source pollution**

Livestock Farming

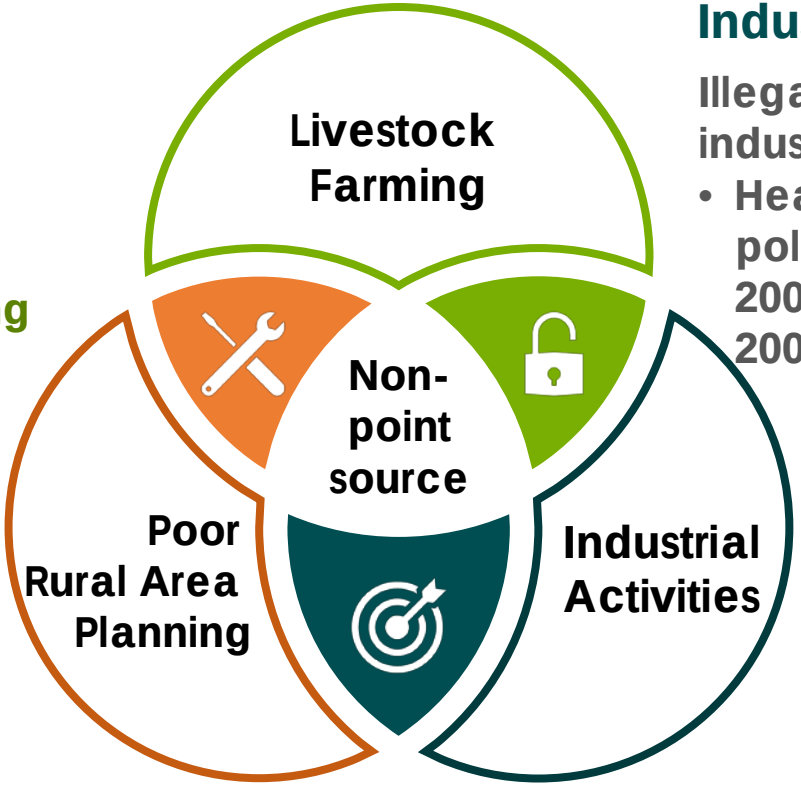
Illegal discharges of animal waste

- **Organic Pollution**
- **Antibiotics pollution (Deng et al., 2016)**

Industrial Activities

Illegal discharges of industrial effluent:

- **Heavy metal pollution (Sin et al., 2001; Cheung et al., 2003)**



Poor Rural Area Planning

- **Runoff from unsewered village house**
- **The rivers mainly for stormwater conveyance and flood prevention**

(Sin et al., 2001; Cheung et al., 2003; Deng et al., 2016; EPD, 2017)

River Water Quality

- The multiple values of the rivers
- Accessibility to the waterbodies
- The potential for sustainable river management

Source: SCMP, 2017
This is a chicken farm in Yuen Long. Antibiotics were used by the farmers on chickens to prevent diseases and keep them healthy

Source: HKFP, 2015
This is a tributary of Shing Mun River near Fo Tan. It is believed that the blur/green colour of the river was caused by the illegal dumping of pigment from the construction sites near Fo Tan Station

Antibiotics pollution:

- Cause hazardous effects in aquatic organisms
- Potential risk to the food, even at low concentration
- Public health risk

Industrial activities:

- E.g. Heavy metal pollution
- Act as secondary source of pollution to the river water

Nature of River

Hydraulic performance

Ecological enhancement

Maintenance & management

Cost

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River channelization

- **Straightening** channel transforming natural landforms
- Decreasing ecological function and stability, but
- Improving hydraulic performance

✓ Sediment removed
✓ Covered with concrete

↓

Change in landscape
Change in hydrology
Loss of habitat complexity
Loss of natural function of floodplains

How does the local Geography curriculum approach river resource management?

Are what have been included in the curricula appropriate and relevant, in line with global contemporary practice and scholarly arguments ?

Sustainable River Management

Items	Hong Kong	Singapore	United Kingdom
Management Approach	• Disaster prevention • Mainly for flood control and drainage usage • "Stay away from river" culture	• Human-centered • Biodiversity conservation • Water-friendly culture	• Human-centered • Biodiversity conservation • Water-friendly culture
Management Strategies	• Flood control • River revitalization (since 2015)	• Water conservation • Water security • Quality of life (social + economic + environment)	• Urban river restoration is an integrated part of Sustainable urban drainage system • Integrated design (water quantity, water quality, amenity & biodiversity) • Site management (design, maintenance &education)
Purposes	• River revitalization (in slow progress)	• ABC Waters Scheme • A: bring people closer to water • B: beautiful recreation space • C: clean	• River Basin Management Plans • Improve water quality • Biodiversity conservation • Manage flooding against climate change • Economic benefits • Recreation & tourism
Reference	(DSD, 2018)	(PUB, 2018)	(Ashley et al., 2015; EA, 2016)

Items	Hong Kong	Singapore	United Kingdom

Geography Education	**S1-S3: The Trouble of Water- Too much or Too little**
	• Water problems in China:
	• Uneven distribution of water
	• Flooding
	• Drought
	• Water pollution
		• Lower Secondary
		• **Issue 2: Will you taps run dry ?**
		• Water shortage and its impact
		• **Water resources management**
		  • **Reduce water consumption**
		  • **Increase water supply**
		  • **Conservation**
			• **GCSE curriculum**
			• Fluvial processes and landforms
			• Management strategies
			  • Hard engineering
			  • Soft engineering
			  • Flood warnings and preparation**, flood plain zoning, planting trees and river restoration**

	S4-S6: Managing River and Coastal Environments • River landscapes • Fluvial processes of river • River channelization • Human activities	• **Investigation 2: What is the quality of water in a waterway or water body ? How do human activities affect it ?** • Measurement of water quality and the accept-able range for use by human and to support freshwater fishes • How human activities affect the quality of water in Singapore and the assigned waterway or water body	
Reference	(EDB, 2011; EDB, 2017)	(MOE, 2014)	(AQA,2016)


“
The importance of Education as a pivotal strategy for sustainability is recognized throughout the world. Formal schooling and subject curriculum are involved in this strategy.
”

Sustainability Education in Geographical Education

Schooling and Curriculum

Further thinking of existing local curriculum:

- Promoting water conservation and sustainable water resource management

What can be pursued:

- Water conservation e.g. protection of water resource/ reduction of water consumption by individuals/community/industries (water footprint)
- Sustainable water resource management e.g. sustainable drainage system/river revitalization

Institution

Green & Smart Campus

To reduce water footprint, promote water conservation education

- Campus can generate significant environment impacts as a result of activities and operations (Marinho et al., 2014)
- Rainwater harvesting system : irrigation/provide water for green landscape
- Installation of Water efficient fittings: monitoring and managing water flows

Benefits:

- Resource and financial savings
- Influence the whole community

Sustainability Education in Geographical Education

Administration

For rational use of water

- Water conservation policy in campus

A holistic and institutional perspective in water conservation – implying cross-disciplinary programmes/ activities

Sustainability Programs

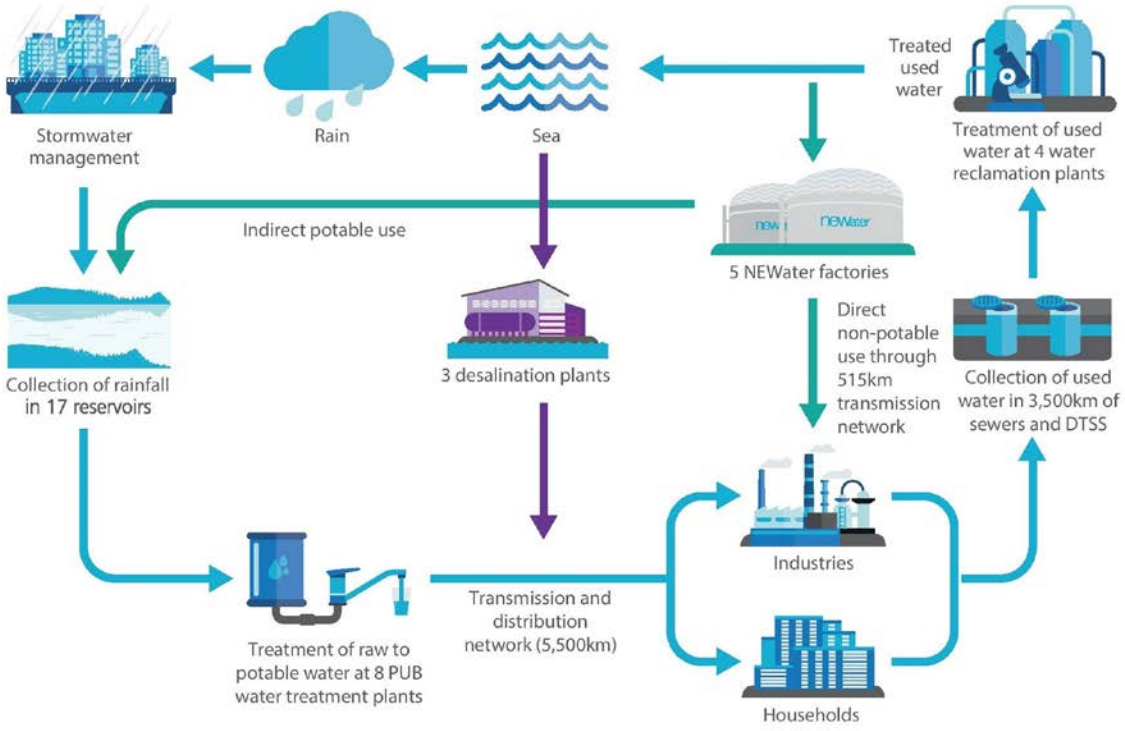
- Launching sustainability initiatives requires the implementation of short term activities with rapid and noticeable results (Marinho et al., 2014)
- Organizing multiple water saving activities with students' participation
- E.g. catering, gardening, farming activities, etc.
- Drive behavioural change of students

Sustainability Education

Example: Singapore's National Water Agency

Three key strategies to water management:

1. Collect every drop of water
2. Endless reuse of water
3. Desalinate seawater



Sustainability Education

Role of geography

- **Supply (reserve and reservoir)**
- **Spatial association and distribution**
- **Interaction between human activities and natural environment**

Diversifying Water Supply

1. Water from local catchment
2. Imported water
3. NEWater
4. Desalinated water

Education of the public (individuals, households, workplaces and schools) of efficient water consumption practices

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