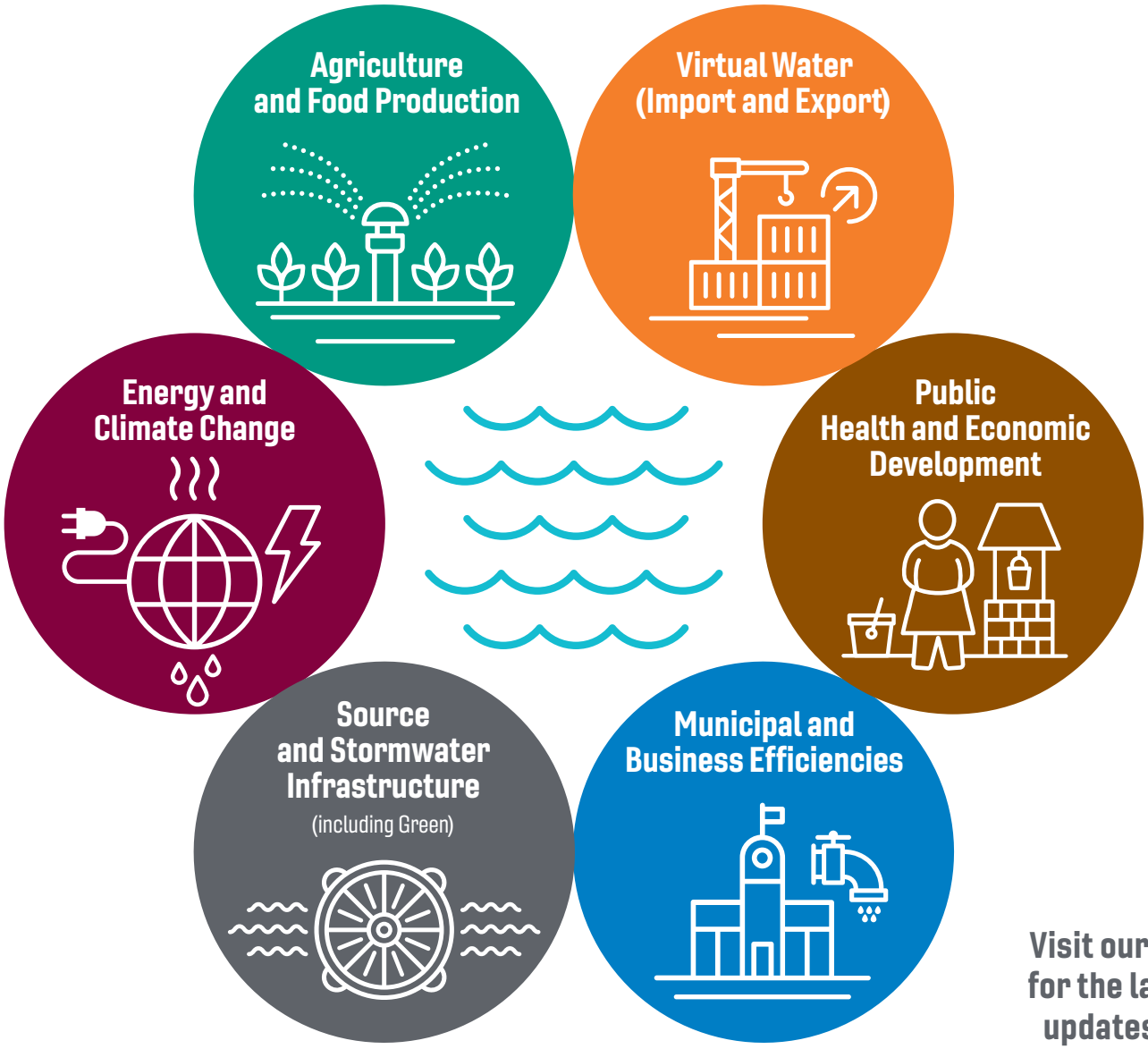
COLLEGE OF NATURAL RESOURCES AND ENVIRONMENT
CENTER FOR LEADERSHIP IN GLOBAL SUSTAINABILITY
VIRGINIA TECH

WATER

systems-thinking approach to resource management

Abundant but finite, water is critical to **human health**, **food**, **energy**, and **economic production**. Students learn how to prioritize managing our water systems, and consider factors that affect the **supply and demand** for water in different areas of our lives. Water resources and **innovative best management practices** are examined at local, regional, and global scales.



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AGRICULTURE AND FOOD PRODUCTION

Globally, 70% of freshwater is used for agriculture, which is the largest source of nutrient and sediment pollution in watersheds.[1] Students learn about strategies and techniques for minimizing the impact of agriculture and food production on water supply. As demand for food and water increases, reducing waste and inefficiencies in the food and agriculture sectors is critical to improving water quantity and quality, locally and globally.

VIRTUAL WATER (IMPORT AND EXPORT)

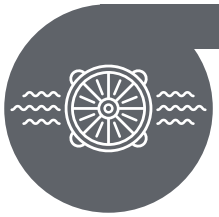
Water is required to produce most goods and services. When they are exported, the consumer becomes an importer of virtual water. Accounting for virtual flows of water helps sustainability professionals think more clearly about the real risks of resource scarcity and the role that trade plays in mitigating or worsening those risks.

ENERGY AND CLIMATE CHANGE

Energy production accounts for 40-50% of all freshwater withdrawals in the U.S., yet only 10% is consumed.[2] Students dig into the complex and challenging interdependencies between water and energy required to run modern societies, including the links to climate change mitigation and adaptation.

PUBLIC HEALTH AND ECONOMIC DEVELOPMENT

Globally, nearly 1 in 5 people live in areas of water scarcity,[3] lacking access to water required to grow food, drink, and use for sanitation. Students examine strategies for improving water quality and access in urban and rural areas around the world and domestically.



SOURCE AND STORMWATER INFRASTRUCTURE (INCLUDING GREEN)

Stormwater runoff from impervious surfaces in urban areas like roads and parking lots adds huge pollution loads to water systems. Climate change compounds this challenge. Students delve into water management, conservation, economic development, and climate adaptation in the Chesapeake Bay watershed and beyond.

MUNICIPAL AND BUSINESS EFFICIENCIES

U.S. water use declined over the last four decades after peaking in 1980,[4] despite overall national economic gains and an increase in total population. Students learn about the drivers of this trend and strategies for its continuous improvement.

REFERENCES

1. The World Bank, Understanding Poverty: Agriculture; 2020
2. Union of Concerned Scientists, "How it Works: Water for Electricity"
3. United Nations Department of Economic and Social Affairs (UNDESA), Human Development Report
4. U.S. Geological Survey, Trends in Water Use in the United States, 1950 to 2015

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FROM THE CLASSROOM

As a part of their coursework where they learn advanced leadership skills, such as building partnerships and cross-sector collaborations, XMNR students have opportunities to meet the experts, analyze the data, and make recommendations about large-scale, ongoing green-infrastructure projects.

The Clean Water Partnership, Prince George's County, Maryland

thecleanwaterpartnership.com
Expert panel presentation and discussion of effective water management in an urban area facilitated through a public-private partnership model.
Read more on our blog:

- **Green infrastructure: construction, communication, and community**
- **Clean water for all: how public-private partnerships work with communities**

Water Words That Work

An immersive communications workshop designed to teach students how to share complex information inherent in sustainability topics in an inspiring and accessible way.
www.waterwordsthatwork.com

Personalized Learning

During each system module, students are encouraged to dig deeper into one or several topics of their choice within the given theme (e.g., water), research thoroughly, and contribute their findings and insights to team assignments. Similarly, each system assignment offers a chance to dig into specific cases and hone different leadership skills of the student's choosing: project management, negotiation, coalition building, conflict resolution, communications, and more.

Professor Bruce Hull on Water Systems

In this video, Dr. Hull discusses systems thinking and problem-solving focused on water systems, including food and agriculture, energy-water nexus, virtual water, public health, water and sanitation, human rights, ground water, and municipal efficiency.

▷ Watch (30:27 min)

Visit our site for the latest updates on program details.

QUESTIONS? **Contact our Academic Advisor Emily Talley: emtalley@vt.edu ■ CALL: 571-858-3338**