SDG Academy - Nature-based solution strategies

Related SDGs: #11 Sustainable Cities & Communities, #13 Climate Action, #15 Life on land, #6 Clean water & sanitation

Unit 1 – Personal Relevance

- Simple things anyone can do:
    - Leave some wild green spaces in your garden for pollinators and insects
    - Plant an urban garden on your balcony or backyard
    - Green your building's roofs by planting trees or flowers to improve thermal comfort and increase biodiversity
    - Host a tree-planting event, community clean-up or eco-picnic
    - Create urban gardening opportunities for communities.
- Borneo case study
    - Significant Deforestation for palm oil cultivation, illegal timbering – focus on education & resources initiative for alternative livelihoods to promote sustainable development & reforestation

Unit 1.2

- Solutions for carbon sequestration, hazard barriers (which can transition from hazard to disaster), public health (clean air, nutrients in food, clean and safe water)
- Challenge 1 discussion post – why is this topic important to you?

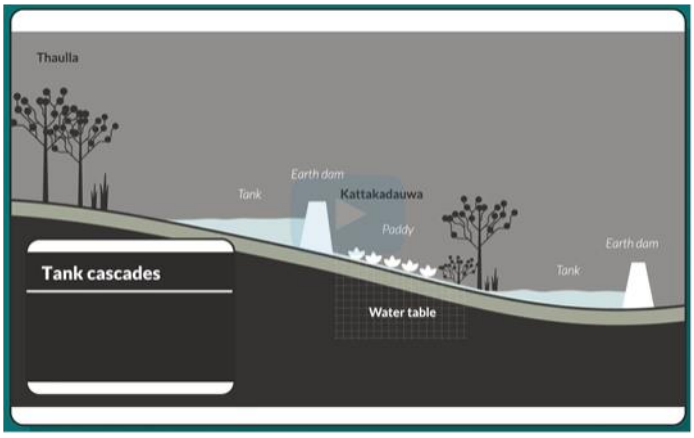
  "Having lived in Florida for most of my life, I understand the potential dangers of storms especially when it comes to hurricanes. I currently work in a regulatory agency for wetlands protection and I find that increasing property owners coming from out of state purchase lakefront or waterfront properties (canals and the open bay) and do not understand the repercussions of clearing shoreline vegetation or hardening their shorelines. I believe having a better understanding of nature-based solutions puts me in a better position to teach new Florida residents about the importance of protecting their shorelines in the best possible manners."

- Colombia case study: Reducing landslide hazard risk using native plantings for soil stabilization. Involved stakeholder participation from municipalities and farmers.
- Unit 1, 360-based discussion post – Padang Shoreline video

“Based on the video footage, the shoreline has been cleared of any vegetation to provide a sand beach environment meaning there is hardly any natural barrier to ameliorate the impact of a potential tsunami. Shops and low-income housing are just across the road from the beach placing an already vulnerable population in even greater hazard vulnerability. The buildings just a few meters from the shoreline appear to be a maximum of 3-stories tall where there is no high-ground for people to take shelter on a short notice. It does not appear that there is anything protecting people and infrastructure from a potential tsunami.”

Unit 2 – What are NbS

- Tips for communication: ensure sources are reputable to combat misinformation & use art to spread messages!
- Ecosystem/ nature-based solutions includes (1) Climate Change Mitigation & (2) Adaptation, (3) Environmental Management, & (4) Disaster Risk Reduction
- Technology in conjunction to nature-based solutions is a good strategy – for example, landslide detection and warning technologies to minimize risk of hazards. Nature component is to plant vegetation for soil stabilization.
- Sri Lanka Case Study
    - Common disasters here include earthquakes, droughts, and floods. Disaster Risk Reduction (DRR) strategies have included protection of wetlands, coral reefs, sand dunes, mangroves, forests, and harvesting rainwater. Over 1,000 tank cascade systems to help with drought relief. These strategies promote biodiversity & livelihoods through diversified income opportunities.



- “blue carbon” is stored in coastal and marine ecosystems where there is greater carbon sequestration per unit than in terrestrial forests
- Green, blue, and grey infrastructure – where the *grey* is artificially built/ engineered (for example, seawalls)

Unit 2.2

- Challenge #2 discussion post – example of nature-based solution:
  "Losing shoreline frontage is a major concern in lake-front or coastal communities in the Tampa Bay region. While native-based solutions are the preferred method, sometimes a hybrid approach that includes some hardening may be best for climate change adaptation. An example includes planting native and beneficial vegetation along the shoreline in appropriate planting zones, and creating a rock or oyster shell barrier between the planting and the open water to provide a buffer from wave action. Sometimes, wave action does not allow native plantings to take hold and survive on their own. This would be an example of a combined geen and grey infrastructure strategy."
- Kenya Case Study
    - Tree and other edible crops are increasingly being planted to reduce risk of landslides. Early warning detection systems such as meteorological data has also been crucial in better understanding landslides and being prepared to avoid disasters. The community radio station is of significance in this case study as this communication strategy has helped in informing the rural community how to reduce landslide risks and minimize disaster potential.
- Unit 2, 360-based discussion post – Water Pollution in Padang, Indonesia:
  "People living in this area may benefit from a hybrid nature-based and engineered approach to combat biannual high tides that bring floods of water polluted with runoff chemicals and human fecal matter. A water treatment operation may be beneficial to prevent fecal matter from polluting any clean water sources. To take it a step further, compostable toilets may eliminate the need from having to spend money and resources on engineering a water treatment facility altogether. Another grey engineering strategy may be to add skimmers as control structures to reduce the amount of debris and pollution material drifting into the waterway. The nature solution component would be to plant native vegetation that can create a wetland system that filters some of the toxins and pollutants in the water. Plantings will also reduce potential flooding from the high tide events. With the public knowing about the pollution and toxicity in their waterways, the well-off folks may make the decision to move elsewhere, but the lower-income and vulnerable people may not have a choice in the matter. For this reason, it is important for the local community to be aware and find solutions that will benefit their waterway and community."

Unit 3 – Applying NbS to urbanization, costal development, & drylands

- Working with nature in cities, coastal areas, & drylands
- Challenge #3 discussion post – climate impacts and nature-based solutions in your area:
  "I live approximately one hour from the coast in a sub-urban area, so my area has components of both the city and coastal categories. Flooding is the major climate impact I have experienced in this area. Although there are many wetlands surrounding my immediate community that

help with stormwater absorption, it appears many of these wetlands are not connected and are fragmented with roads and building developments which may be contributing to the floods during both regular rain events and larger storms. Using bioswales, similar to the ones in Seattle, may assist with rerouting stormwater away from roads and other infrastructure. However, I believe a big impact can be made by individual homeowners and smaller communities that take action by collecting rainwater and reducing the amount of impermeable land. The more fill and concrete taking up surface area, the more likely floods are to occur because the water needs somewhere to go. Green roofs and permeable driveways and yards could help mitigate flooding in this community."

- Unit 3, 360-based discussion post – Sam Dzong Village, Upper Mustang, Nepal:
  "Sam Dzong is one of the many examples of places and communities that contribute very little to climate change but bear some of the greatest consequences of it. Although there is a trend of families and young people leaving the village, the folks that choose to stay may do so because of a connection to the land, because of financial constraints, and because of general lifestyle preferences. Migrating is not an easy decision. The region is experiencing landslides, flash floods, water shortages, and soil salinization. Some NbS possible in this context include rainwater collection and native plantings. Rainwater collection can can reduce the amount of water available for causing landslides, and it can be stored to minimize droughts and irrigation concerns. Native plantings along the hills will also reduce the potential for landslides, they will provide greater stabilization for the soil, and they will improve soil quality which is quickly degrading."

Unit 4 – Including communities, youth, & indigenous people in NbS

- Green Infrastructure Movement in Schoolyards in the US – encourages ecological literacy
- Challenge #4 discussion post - Ideas for promoting Nature-based Solutions:
  "I strongly believe exposing children to nature is crucial for an accelerated development of NbS. Even beyond exposure, nature should be an integrated component of learning in general. During my time as a farm intern at a local community farm, there would often be field trips where grade school children would tour the farm and have a hands-on experience. I remember many of them being astonished at learning that a carrot comes from picking it from the ground rather than simply grabbing it from a plastic bag at a grocery store. Of course, this is not the experience of every child in my area, but it highlights that more work can be done to ensure our future generations, at a minimum, have a basic understanding of nature. I believe early childhood nature education can even be beneficial for children that go into fields that are traditionally separated from nature. Professionals in finance and communications, among others, will offer broader human perspectives and even have the potential to transform their fields having been exposed to nature systems from an early age."

- Unit 4, 360-based discussion post – Tetang Village, Upper Mustang, Nepal:
  "Climate change in this Himalayan region is experienced through increased temperatures, glacier melting, increased droughts, changes in temperature and rainfall patterns, and threats to biodiversity. Each of these factors play a threat to the agriculturally focused livelihood source in this region. Terracing is an onsite NbS that has helped with soil erosion and water loss for cultivation. However, when realizing that some of the causes for erosion and unreliable precipitation patterns are bigger than the local village, then it is clear that a larger effort from the surrounding communities needs to take place. For example, larger surrounding South Asian cities relying on unsustainable sources for energy demands (which largely contribute to rural glacial melt) should begin to quickly take responsibility for implementing nature-based and renewable solutions for energy demands."

Unit 5 – From policy to practice

- Policy action is best informed at the local level/ from grassroots movements
- Ramsar Convention – international treaty for protection, restoration, & management of wetlands
- Challenge 5 discussion post – Hybrid solutions that have successfully reduced recent impacts of hazard events: "Babcock Ranch, Southwest Florida during Hurricane Ian. This Category 5 hurricane struck the southwest region of Florida, US in 2022 and has been the deadliest hurricane to strike the state in recent times. Babcock Ranch, a newer development in the region, sustained the hurricane with very little impact despite other surrounding communities having been significantly impacted with destruction. This community was developed using hybrid designs where stormwater and sustainable water and sewage systems prevented home flooding. Wind damage was also minimized through a hybrid design where utility lines and other infrastructure are subterraneous reducing the danger of projectiles. https://www.cbsnews.com/news/babcock-ranch-solar-power-hurricane-ian-60-minutes-2022-10-09/ "
- Unit 4, 360-based discussion post – Kuttemperoor River tributary restoration:
  "Based on the video evidence, the apparent restoration strategies included removing litter and other dumped waste from the river for initial cleanup, removal of proliferating weeds, and halt to mining operations- or at least excessive mining. The next step was to improve water quality in attempts to restore flow and overall condition. On one side of the tributary, plantings and a gulley could be seen just on the other side of an artificial berm. The gulley and plantings were probably installed for water filtration, purification, and protection from overflow and contamination. On the other side of the tributary, another artificial shoreline stabilization structure could be seen possibly for protection against further bank degradation from mining

and for orienting water flow. At face value, this hybrid approach may not seem like the *greatest* solution for river restoration due to the semi-permanent bank hardening, but given the site-specific circumstances, and based on the fact that local villagers led the restoration, it proved to be a good initiative for ensuring that improvements be made before it was too late."

Unit 6 – The business-case for NbS

- Nature as business paradigm – valuation of nature resources & services (Sustainable Asset Valuation {SAVi] tool)
- Challenge 6 discussion post – Business implementing NbS:
  "Restoration Systems is a North Carolina based company which carries out projects focused on mitigation and restoration of environmental systems. The services offered that caught my interest include living shorelines and dam removal. The service description for living shorelines highlights the damage that failed hardened shorelines have contributed to in the past. Their product includes a hybrid approach where native plantings are reinforced with oyster shell bags free of plastics. The dam removal service description recognizes a needed improvement of water quality and flow, as well as habitat improvement for migratory fish. https://restorationsystems.com/solutions/ "

Unit 7 – Time for action

- "knowledge is power, but only if that knowledge is converted into action"
- In my role permitting marine construction in tidally-influenced properties in my county, I plan to provide property owners with a more well-informed explanation for the importance of NbS, especially for shoreline stabilization. The most I can do in this role is to be as informative as possible and explain the ecological and financial benefits of doing so.

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