OL 332 Assignment Four Discussion.
Online Learning: OL 332 Water Conservation & Management
Center for Sustainable Development. https://csd-i.org/ol-332-water-conservation-management/

Assignment Four. Survey of Activities for Environmental Challenges
There is a tremendous amount of support and overlap between the three courses 333 Climate Smart Agriculture, 345 Community Based DRR, and this course, 332 Community Level Water Conservation and Management.

On the one hand, in 333 we investigated putting barriers to water movement in farm fields—and this could be considered water conservation. It can also have a positive reduction in flooding which can help with the challenges seen in 345. In 332, will be investigating things like restoration of the communities watershed, which can also have a positive impact on both agriculture and the reduction in flooding.

So these three courses work together in support—much like a three-legged stool—stable even on uneven terrain.

So there were some decisions to be made about which technologies would be investigated in which course. I made the decision to do in-field farm technologies in 333, and in 345 to focus less on mitigation activities and more on the actual emergency itself. In 332 will be looking more at landscape level conservation and restoration—and at developing water related infrastructure such as water harvesting systems.

It's been interesting for me to observe over the past few years how many of these community based projects are extraordinarily simple and how many are able to be launched with little or no cost—and with the community's involvement in project management. If your project is one of those—then the assignment on environmental technologies may be more appropriate for you because they are things that community members can join forces together to do.

The assignment on developing infrastructure will bring a different set of challenges. In reading studies—many people discover, for example, in projects that install water systems like connecting water pipes to individuals homes—50% of the installed systems have failed within two years. The reasons cited are that they were designed by amateurs, installed by amateurs, the community members weren't engaged in the decision-making process of where to locate the system and how it should be designed—and the community members were not trained in maintenance and repair.

In the environmental assignment you will certainly need to approach experts in the design of the restoration plan. The infrastructure assignment you will also need to approach an expert—and this expert will be more of an engineer then an environmental designer—and they may be expensive. So the environmental assignment may develop a low-cost/no-cost project—but an infrastructure project may take a year or two to design and fund. It will likely be quite expensive and involve hiring professionals to do the installation. Community members will also need to be trained in maintenance and repair—and a funding mechanism will need to be established to cover those costs.

Deforestation is a huge challenge in the developing world. Forests assist tremendously in allowing rainwater to percolate into the soil on the forest floor and to recharge the underground water system and greatly reducing runoff which can lead to flooding.

I'm including excerpt from a field guide (to be used in Assignment 6) in this discussion in order to give you an overview of check dams.

Excerpt from OL 332 Field Guide Community Level Watershed Management.
Field Guide: Community Level Watershed Management.
Tim Magee

In order to slow water coming off of the watershed we're going to explore check dams for restoring gullies. The purpose is to slow the velocity of water movement thereby reducing erosion and allowing water to infiltrate into the soil. Water infiltration will recharge local groundwater systems and provide soil most are for the reforestation program. A reduction in runoff from heavy rains will reduce flooding in the village. Over time, soil accumulating behind the check dams will begin the process of filling in the gullies. Check dams are simple structures built inside of gullies out of packed brush or loosely piled rocks—and they slow the velocity of water within the gully

Two kinds of check dams were chosen: loose stone and brushwood. They are semi-porous: some water will pass through them and reduce water pressure build up. Consequently the engineering requirements are minimal. Rainfall conditions, terrain and building materials vary from location to location, and community members decide the size and configuration of their dams. These check dams will be made of locally found materials

Brushwood check dams. A brushwood check dam is a framework of vertical posts sunk 1 meter into the ground .5 meters apart. Two parallel rows of these posts are placed .5 meters apart. These types of dams are rarely more than 1 meter high and the catchment area should be 1 hectare or less. The first step is to clear the dam's location in the gully of brush and loose soil. Cut a slot 30 cm deep into the walls of the gully. Dig a series of 15 cm diameter holes for the posts a meter deep with a post-hole digger. Ram the posts vertically into their holes and pack dirt around them so they are rigid. Cut brush or branches 2 or 3 cm in diameter into 65 cm lengths. Tie them into bundles 15 cm in diameter. Do not place these bundles directly on the ground, but on a bed of straw or mulch to prevent erosion under the brushwood. Place them in layers inside of the framework making sure each layer is well compacted. Every second layer, cross stays should be tied to the vertical posts connecting the two rows of posts. The bundles should penetrate the walls into the 30 cm deep slot and anchor the dam. The top of the check dam should be curved with a low section in the center for water to spill over if the check dam fills up. Bundles of sticks should cover the ground on the downhill side of the dam so that soil below the dam won't be eroded.

Loose stone check dams. Typically, these types of dams are rarely more than 1 meter high and the catchment area should be 2 hectares or less. The first step is to clear the dam's location in the gully of brush and loose soil. The second step is to dig a 30 cm deep trench beginning at just below the top lip of one bank progressing across the bottom of the gully and extending to just below the top lip of the opposite bank. This will allow the stone dam to be anchored in position. The highest point of the dam should be lower than the surrounding land to prevent flooding of adjacent fields. The base of the dam should be wider than the top—so the walls slope inwards from the base towards the top. The first layer of stones in the trench act as the anchor; this layer of anchor stones will be one stone width wide. The next layer of stones should be three stones wide and after several layers narrow to being two stones wide as it rises to the top. The top of the check dam should be curved

with a low section in the center for water to spill over if the check dam fills up. A layer of stones should cover the ground on the downhill side of the check dam so that soil below the dam won't be eroded as water spills over the top.

Assignment 4 Resources

Water Conservation and Management

UN/ISDR: Water and Risk in Africa -- A Community Leaders Guide
http://www.unisdr.org/we/inform/publications/8541

UN/ISDR: Water and Risk in Africa -- A school's Guide
http://www.unisdr.org/we/inform/publications/8542

Reforestation

Village Forestry Training Manual. Forming and operating a village forestry core group. Pp. 155 - 161
http://www.mekonginfo.org/assets/midocs/0001415-environment-village-forestry-training-manual.pdf

CTA: Establishing a Tree Nursery
http://ageajg.weebly.com/uploads/2/0/3/1/2031275/establishing_a_tree_nursery.pdf

Sustaining Tropical Forest Resources: Reforestation of Degraded Lands
https://www.princeton.edu/~ota/disk3/1983/8321/8321.PDF

Community managed forests and forest protected areas: An assessment of their conservation effectiveness across the tropics
https://www.cifor.org/library/3461/

Farm Africa: The Key Steps in Establishing Participatory Forest Management
http://www.farmafrica.org/downloads/resources/Key%20Steps%20in%20Establishing%20Participatory%20Forest%20Management.pdf

TFT: Sustainable Community Forest Management
https://rightsandresources.org/wp-content/exported-pdf/tftcommunityforesthandbook.pdf

Manual on Reforestation and Erosion Control for the Philippines
http://www.slideshare.net/DaErudite/manual-of-reforestation-and-erosion-control-for-the-philippines

Controlling Runoff through Check Dams

Gully plugging using check dams
http://www.icimod.org/?q=10350

SSWM: Check Dams & Gully Plugs
http://archive.sswm.info/category/implementation-tools/water-sources/hardware/precipitation-harvesting/check-dams-gully-plugs

Water Harvesting and Soil Conservation and High Rainfall Areas
http://www.bebuffered.com/downloads/wwmanual_entire.pdf

SAI: Rainwater Harvesting and Artificial Recharge Groundwater
http://www.saiplatform.org/uploads/Library/Technical%20Brief%202%20%20Rainwater%20harvesting%20%20artificial%20recharge%20to%20groundwater.pdf

FAO watershed management field manual -- Gully control
http://www.fao.org/docrep/006/ad082e/AD082e03.htm

ICRISAT: Gully Control in SAT Watersheds
http://oar.icrisat.org/3766/1/GullyCcontrolInSATWatersheds_2005.pdf

CASQA: Check Dams SE-4
https://www.casqa.org/sites/default/files/BMPHandbooks/BMP_Municipal_Section_4.pdf

R. K. Sivanappan: Technologies for water harvesting and soil moisture conservation in small watersheds for small-scale irrigation
http://www.fao.org/docrep/W7314E/w7314e0q.htm

Gullies and Their Control Technical Supplement 14P Purpose
https://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17826.wba

Good luck—I look forward to hearing about your project—please move on to Assignment Four.