TTLM – Biological Measures

Learning Outcome 1: Objectives and Benefits of Biological Measures

Guiding questions for discussion (page 25)

1. What are the benefits of biological measures?

Answer:

<u>Ecological benefits:</u>

- *preventing splash erosion.*
- *reducing the velocity of surface runoff.*
- *facilitating the accumulation of soil particles.*
- *increasing surface roughness which reduces runoff and increases infiltration.*
- *the roots and organic matter stabilise the soil aggregates and increase infiltration.*
- *dead organic material improves the soil's structure and fertility.*
- *windbreaks.*

<u>Socio-economic benefits:</u>

- *Harvest: either in the form of living (fruits, legumes) or dead material (straws that can be used as fodder). Be aware that animals do not damage the biological measures too much by grazing directly on the biological measures.*
- *Low-cost when maintained properly.*

- *Fencing*
- *Shade and resting place for people and livestock during extremely hot days*
- *Stabilizes the physical structure for a long time.*

2. What are the potential disadvantages of biological measures?

Answer:

- *Uncontrolled spread of introduced species.*
- *Time intensive to start and maintain.*
- *Takes up land otherwise suitable for crop cultivation.*
- *Maintenance is needed to ensure the long-term effect.*
- *Biological measures do not have an immediate effect, it takes time for the plant to develop and become effective.*

3. Could you explain the objective of a biological measure to a classmate?

Answer: biological measures function as supportive tools for the existing physical structures, aiding in the conservation of soil and water. They aim to foster enduring ecological and socio-economic benefits.

Self-Check Test (page 26 & 27)

Part I: Multiple-choice questions

1. Which measure is more important; physical or biological measure (1 pt)?

1. Physical measure
2. Biological measure
3. **Combination of the two**

2. What is the main function of plant roots in the context of biological measures (2 pts)?

1. Stimulate plant growth.
2. **Stabilizes the soil.**
3. Use as fodder.
4. Fencing

Part II: Short Answer

1. At the start of the biological measure implementation, list 3 points that need to be considered (3pts)

Possible answers:

- *a specific objective for stabilising & rehabilitating the WSWs / DSM area.*
- *a specific strategy for planting the biological measure.*
- *merit of the vegetation to meet the multiple needs of local communities.*
- *commitment and willingness of local communities to protect and manage the planted vegetation covers.*
- *suitability of the selected vegetation, considering soil, climate, available moisture and other factors*
- *Variation in the slope percentage.*

2. Next to ecological benefits for the landscape, biological measures have multiple socioeconomic benefits, name 3 (3pts)

Answer:

- *Harvest: either in the form of living (fruits, legumes) or dead material (straws that can be used as fodder). Be aware that animals do not damage*

the biological measures too much by grazing directly on the biological measure.

- *Low-costly when maintained properly.*
- *Fencing*
- *Shade and resting place for people and livestock during extreme hot days.*

3. Name 3 biological measures strategies that will be explained in this Learning Guide (3pts)

Answer:

- *Grass strips*
- *Stabilization of physical structures/ riverbanks*
- *Biological check dam.*

Learning Outcome 2: Site Analysis

Self-Check-Test (page 42 & 43)

Part I: Multiple-choice

1. What is the main aim of a proper site analysis to determine biological measures (2pts)?

A. Because (semi-)arid landscapes can have different characteristics determining biological measures selection
B. Creates community awareness, resulting in more incentives.
C. To know the climate of a specific site
D. <u>To explore if the area is suitable for biological measures.</u>

Part II: Open Questions

Answer: Sugarcane

1. Name 2 characteristics that a species should match in a flood-prone area in the Afar region (2pts, 1pt per right answer).

Answer:

- *Timing and size of floods/peak periods*
- *Ability to handle waterlogging conditions.*

2. Name 3 different species type groups (3pts, one point per right answer)

Answer:

- *Leguminous non-woody plant species*
- *Shrub/tree species*
- *Non-forage plant species*

Learning Outcome 3: Biological measure strategies and Management

Self-Check-Test (page 65 & 66)

Part I: choose the best answer.

1. What is the main aim of biological measures (2pts)?

1. Lift productivity
2. Create awareness of regreening among communities
3. Create windbreaks against wind erosion.
4. **Lift the ecological value of the landscape.**

A vegetation strip is always made from grass (1pt)?

1. **True**
2. False

Out of the following statement regarding biological check-dams, which one(s) are correct (2pts)?

1. **Choose vegetative species that can tolerate waterlogging.**
2. Built directly multiple layers of vegetation so that the run-off decreases.
3. **Regularly check if the check-dam vegetation density is suitable for the run-off.**

Part II: Open Question

1. Mention two ways of grass preparation methods. Mention with each method a pro and a con (4pts, one point for every right answer).

Answer:

Sowing

- *Pro: If successful a lot of plants are available for replanting*
- *Con: Time-consuming and requires a lot of steps including seedbed preparation*

Splitting/Cutting

- *Pro: can improve the time efficiency of the preparation*
- *Con: need to be very careful in order not to damage the biological measure*

Learning Outcome 4: Maintenance & Harvest Management

Self-Check Test (page 82 & 83)

Part I: choose the best answer.

1. Which of the following damaging control options is not an option (2 pts):

A. Leaving the biological measure when it does not damage the physical structure.
B. Pulling the biological measure out of the structure
C. Cut and drill the biological measure when it is not easy to remove.
D. Removing the physical structure to remove the biological measure, then placing the structure back.

Part II: open questions

1. What is a side benefit of maintaining biological measures (1pt)?

Answer: If carried out following proper and proven processes and practices, there could be significant time and cost savings, and it can also align with achieving small harvest outcomes from the biological measures.

Learning Outcome 5: Strategies for controlling invasive Species

Guiding Questions (page 94)

1. What is an explanation of the meaning of control by utilization?

Answer: Implementing methods for controlling the growth of the Prosopis juliflora species, minimizing its negative effects, and discovering ways to derive benefits from its presence in the landscapes. Converting Prosopis juliflora into a valuable resource can offer opportunities to local communities. However, achieving this requires full participation from the local communities. It is crucial to note that utilization should be accompanied by appropriate control measures.

2. Why is it important to know the different utilization techniques of Prosopis juliflora for the communities?

Answer: For the utilization techniques of Prosopis to be successful to control the spread, full participation of local communities is necessary.

Self-Check Test (page 103 & 104)

Part I: choose the best answer.

1. What was the government's main reason to introduce Prosopis juliflora in Ethiopia (2pts)?

A. Improve livelihoods by being a source for biofuel, charcoal, etc.
B. <u>As biological soil and water conservation intervention</u>
C. It wasn't introduced but came as an invasive species by itself.
D. To grow vegetation in (semi-) arid landscapes, which no other vegetation can do.

Part II: open questions

1. What is the main spreading way of Prosopis juliflora (2 pts)?

Answer: Livestock are among the main contributors to the spread Prosopis juliflora:

- *Seed Consumption and Dispersal: Livestock may consume Prosopis seeds along with their forage. The seeds can survive the digestive process and are then dispersed in the manure, providing a fertile environment for germination.*
- *Seed Attachment: Prosopis seeds have adaptations that allow them to attach to animals' fur or skin. Livestock can carry these seeds over considerable distances as they move through different areas.*
- *Soil Disturbance: Livestock can cause soil disturbance through grazing and trampling. This disturbance can create favourable conditions for Prosopis seeds to germinate and establish in new areas.*

2. Name 3 negative effects of Prosopis juliflora (3pts, 1pt per right answer):

Possible answers:

- *Decrease of native vegetation, grazing and agricultural land*
- *Encroaches on riverbeds and canal beds – blocking them and causing drainage patterns to uncontrollably shift.*
- *Prosopis juliflora thorns are poisonous and can even cause blindness.*
- *Livestock, particularly cattle, can become ill when they are almost exclusively fed with pods of Prosopis juliflora.*

3. Explain the two main components in "control by utilization" (4pts, 2pts per right answer)?

Possible answers:

- *Focus on the removal of Prosopis juliflora from a highly productive land or land important for local food security.*
- *Livestock (mainly cattle) play a significant role in the spreading Prosopis juliflora through pod attachment on animal skin. Therefore, it is crucial to avoid or minimize cattle movement between areas with Prosopis juliflora and the significant areas mentioned in point 1.*
- *Farming communities should be encouraged to uproot Prosopis juliflora seedlings when they are still easy to remove.*
- *Governmental support is essential in establishing robust governance institutions and regulations that facilitate the responsible harvesting of Prosopis juliflora for charcoal, poles for fencing and construction, and other income-generating activities. Unfortunately, these activities are currently often discouraged.*

4. Outline 4 utilization strategies of Prosopis juliflora (4pnts, one point per right answer):

Possible answers:

- *Charcoal production*
- *Fodder*
- *Biofuel*
- *Timber*