

Technical Assistance on Plant Cultivation Landslide Prevention in the River Flow Area in Kampung Bendang Nagari River Sariak VII Koto Padang Pariaman District

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ABSTRACT

Watershed areas (watersheds are divided into upstream, middle and downstream areas. Upstream watersheds are characterized as conservation areas, have a higher drainage density and are areas with slopes of more than 15%, lower watersheds are characterized by areas with small slopes (less than 8%) to flat, in some places it is a flood or puddle area. Water management is determined by irrigation water structures. The middle watershed is a transition area between upstream and downstream. (Asdak, 1995). main, (1) vegetative method, (2) Mechanical method, (3) Chemical method (Arsyad, 2010). In watershed spatial planning, vegetative methods and mechanical methods are recommended There are several methods that can be used to prevent landslides in watershed areas, both upstream, middle and downstream, but what is highly recommended is the Vegetative method and cultivating these plants.

INTRODUCTION

River Watershed (DAS), river watersheds are divided into Upstream, Middle and Downstream areas. The Upper Watershed is characterized as a conservation area, has a higher drainage density, is an area with a slope of more than 15%, is not a flood area, water management is determined by the drainage pattern. The Lower Watershed is characterized by areas with small slopes (less than 8%) to flat, in some places areas of flooding or standing water. Water regulation is determined by the irrigation system. The Central watershed is a transition area between the Upstream and Downstream (Asdak, 1995). Otto Soemarwoto, (In NHT Siahaan, 1987), defines an ecosystem as a system consisting of components that work regularly as a unit. Each component has its own function which is not only enjoyed by itself, but also by other components, thus a chain of life will occur based on these functions.

Ecosystems can be understood and studied in various sizes. Whether it is a pond, river, lake, or plot of pond, forest, or landscape. Even the laboratory is an ecosystem unit that can be observed. As long as the main components interact and form cooperation to achieve functional stability, even if only for a short time, the unity can be considered an ecosystem. Vegetation is actually the most determining creature in the ecosystem because it has the following roles: (Zoer'aini Djama Irwan, 1992).

1. As the biggest change in the environment because it has a protective function so that it can reduce solar radiation, reduce extreme temperatures. Through transpiration, water can flow from the soil into the air.
2. As an energy binder for the entire ecosystem. Only vegetation can utilize solar energy directly and convert it into use for other organisms, through the process of photosynthesis. All organisms in the ecosystem are very dependent on the energy it produces as a source of mineral nutrients. Life requires carbon, hydrogen, oxygen, calcium and many other elements

According to Zoer'aini Djama Irwan, (1992). Vegetation has a role in the ecosystem, including, as protection, as a binder of energy for the entire ecosystem, as a source of mineral nutrients. With the existence and maintenance of vegetation in the city, the quality of life will be good. Another benefit is that vegetation has other functions, including reducing the heat emitted by the sun, by absorbing it, reducing the reflection of the sun that falls on the surface of the land, reducing wind pressure, thereby reducing the air temperature around which the vegetation grows, apart from that, it also functions to increase energy. absorb rainwater, and reduce ground pressure from raindrops. In this way, vegetation can protect and reduce surface flow (run off) and accelerate infiltration events. According to Suripan (2006), vegetation and plant density are more important than plant types. Plant density will influence the length of the surface flow path and the area of land covered. On bare land, surface flow will pass relatively straight towards the slope of the land, while on planted land, especially in random plantings, the surface flow path will be in a zig-zag shape, so the path is longer . With the same height difference, a gentler slope will result so that the surface flow velocity is smaller.

On a land surface where there are no plants or other objects, rainwater that falls will fall directly to the surface of the ground. In places where there are plants or other objects, rainwater that falls will stick to the plants or objects. Rainwater that sticks to the surface of plants is called interception water, and the event of retaining this water is called interception. Some of the water will flow directly to the surface of the soil, this event is called through fall, while the other part flows on the surface of the plant (twigs, stems), then reaches the ground, called stem flow. Rainwater that reaches the surface of the land is called surface water supply. Water flowing on the ground surface is called run off. Surface runoff water will collect in lakes, rivers and oceans, while some infiltrated water will evaporate back into the air, some will be absorbed by plants, then will evaporate back into the air through transpiration, while some will be percolated deeper into the ground to become ground water. land (groundwater), then enters the reservoir, river or lake through underground flow (ground water flow). Lake, river and sea water will evaporate back into the air (Arsyad, 2010).

Suripan (2002) states that in wet climates erosion by water is important, while erosion by wind is not significant. Erosion causes the loss of fertile soil layers that are good for plant growth and reduces the soil's ability to absorb and retain water. The transported soil will be carried into water sources called sediment, which will be deposited in places where the water flow is slow. Each land use will have a different influence on soil damage due to erosion, besides that the level of erosion depends on several factors, namely the characteristics of rain and slope slope. Based on its form, erosion can be divided into flash erosion, overland flow erosion, real flow erosion, gully erosion, stream beam erosion, internal or internal erosion. subsurface erosion), landslides (land slide), (Suripan, 2002).

Soil and water conservation methods can be divided into three main groups, (1) vegetative methods, (2) Mechanical Methods, (3) Chemical Methods. (Arsyad, 2010). In watershed spatial planning, of these three methods, the vegetative method and the mechanical method are recommended. In watershed spatial planning, elements of society that inhabit the surrounding area must be involved and become part of overall watershed management, because humans are part of the watershed ecosystem. Agroforestry or agroforestry can be an alternative in an effort to involve the community in preserving watersheds. In an agroforestry system there are ecological and economic interactions between various plant components. Agroforestry is integrated land use that is suitable for marginal land and low input systems (Nair, 1983, in Arsyad). One alternative in agroforestry is an intercropping pattern, where people who have gardens along river flows can combine short-lived plants (3-5 years) with long-lived plants. Several species of woody plants that are commonly cultivated together with Cocoa (chocolate) include Sengon (*Paraserientes* sp), Teak (*Tectona grandis*), and Mahogany (*Mahagony* sp). One way to maintain sustainability in river watersheds (DAS), it is felt that it is necessary to provide education on landslide prevention plant cultivation techniques. This counseling is an application of community service activities which is one of the Tri Dharma of Higher Education, apart from implementing education and research. Specifically regarding this

service, it is proposed as an instrument and method for cultivating landslide prevention plants in river basins.

IMPLEMENTATION AND METHODS

Community service activity with the title "Technical Assistance on Plant Cultivation Methods to Prevent Landslides in the Community in Korong Sungai Bendang Nagari Sarik, Sungai Sarik VII Koto District, Padang Pariaman Regency." This is carried out by gathering the community at the nagari guardian's office, in the form of providing motivation and counseling to the community with material: Increasing community understanding of landslide prevention plant cultivation techniques in the River Watershed (DAS) for the community in Korong Sungai Bendang Nagari Sarik, Sungai Sarik VII Koto District Padang Pariaman. Increasing community insight and knowledge regarding landslide prevention plant cultivation techniques in River Watersheds (DAS) for the community in Korong Sungai Bendang Nagari Sarik, Sungai Sarik VII Koto District, Padang Pariaman Regency. Held on: Day and Date: Saturday, 17 June 2022, Time: 09.00 WIB until finished, Location: at the Wali Korong Sungai Bendang Nagari Sarik Office, Sungai Sarik VII Koto District, Padang Pariaman Regency. And the achievements and targets of this activity. The output of this community service activity is in the form of services, where the team that will carry out this community service activity provides services to partners (the community in Nagari Sungai Durian, Patemuan subdistrict, Padang Pariaman district) in the form of providing materials and counseling about the importance of cultivation of landslide prevention plants in river basins (DAS). The aim of this activity: Based on the existing problems, this activity aims to:

1. Provide an introduction to landslide prevention plant cultivation techniques in River Watersheds (DAS) for the community in Korong Sungai Bendang Nagari Sarik, Sungai Sarik VII Koto District, Padang Pariaman Regency.
2. Provide an understanding of landslide prevention plant cultivation techniques in River Watersheds (DAS) for the community in Korong Sungai Bendang Nagari Sarik, Sungai Sarik VII Koto District, Padang Pariaman Regency

RESULTS AND DISCUSSION

In this activity, the steps we take to carry out community service activities are:

1. The service team carried out field observations, namely in Korong Sungai Bendang Nagari Sarik, Sungai Sarik VII Koto District, Padang Pariaman Regency.
2. Approach and discuss with the nagari guardians about watershed problems, landslides in the watershed area, actions taken by the community and the nagari guardians to prevent landslides in the watershed area.
3. The village guardian and the service team carry out observations in the field, namely in the watershed area

4. After understanding the problems that exist in the area of service, the service team holds discussions and plans the outreach that will be carried out by the team to the community.
5. Due to limited time and costs, this service is carried out in the form of outreach and motivation to the community, perhaps at another time technical assistance will be provided to the community on how to cultivate and at the same time plant landslide prevention plants in the watershed area.
6. This service activity is only carried out for one day in the form of counseling and field surveys of suitable areas, before planting and suitable types of plants.

There is also material presented during counseling and socialization and also motivation to the community, including;

Bamboo Plant Cultivation

Bamboo is a type of grass plant that has cavities and segments in the stem. Bamboo plants are classified into more than 10 genera and 1450 species. Bamboo is also a plant that has fast growth, this is because bamboo has a unique dependent rhizome system with a length increase of around 60 cm or more per day depending on the climate and soil conditions where the bamboo is planted. Bamboo has other names such as reed, aur, eru and Javanese people often call bamboo pring. Bamboo is often used for woven handicrafts such as household utensils or other things, bamboo that is still in its buds is often used as vegetable material. Now many people plant or cultivate bamboo, because cultivating bamboo is not that difficult but only requires knowledge about the methods or techniques for cultivating bamboo. Apart from that, planting or cultivating bamboo can increase your income, whether you sell bamboo in stick form or in the form of crafts. Here is how to cultivate bamboo:

1. Preparation of Bamboo Seeds

Bamboo seeds can be obtained or prepared using stem, branch or rhizome cutting techniques. Each type of bamboo has differences in seed preparation, for example yellow bamboo can only be obtained by rhizome cuttings, Petung bamboo can be obtained from these 3 methods, while apus bamboo can only be obtained from branch and rhizome cuttings. However, if you don't want to bother preparing the bamboo seeds yourself, you can buy bamboo seeds according to your wishes at a plant shop.

2. Preparation of planting land

The planting land should be prepared at least 3 to 4 months before planting. Make a planting hole in the planting area that will be used for planting bamboo with uniform or different sizes, depending on the availability of land and seeds (usually for bamboo seeds from shoots or bamboo shoots, the size of the planting hole is around 50 cm x 50 cm x 75 cm and for seeds that come from stem cuttings, the planting hole is usually made with dimensions of around 150 cm x 150 cm x 75 cm.)

However, before making a planting hole, the planting area is cleaned of weeds or other disturbing plants, then make the planting hole, after the planting hole is finished, the planting hole is then composted by mixing the soil dug in the hole and leaves. Composting takes about 2 months. Because bamboo can be planted anywhere, whether in the highlands or lowlands, it can even be planted in gray water areas (a type of water bamboo) and there are also types of Japanese bamboo that can be planted indoors, whether in planting areas or planting pots.

3. Bamboo Planting

Once everything is ready, then plant immediately. Planting bamboo is the same as planting other plants, the prepared seeds are inserted into the prepared planting holes (composted) and then covered with soil. The most recommended planting time for planting is during the rainy season, namely around December to January or no later than February.

4. Bamboo Plant Care

After planting, the bamboo plant definitely needs proper and good care so that the bamboo plant can also grow well. Maintenance carried out includes weeding or cleaning the planting land from weeds or other pest plants, or you can also spray pesticides or herbicides to overcome the problem of pests, weeds or other pest plants. Apart from this care, it is also necessary to carry out fertilization and thinning pruning on bamboo plants that have grown tall so that the bamboo plants can grow neatly and grow well. The care for each age of bamboo plant varies.

Cultivation of Sugar Palm Plants

1. Growing Conditions

Sugar palm can grow to a height of 9 - 1,400 meters above sea level. However, growth is best at an altitude of 500-800 meters above sea level with rainfall of more than 1,200 mm per year, or in temperate and wet climates according to Schmidt and Ferguson.

2. Palm Sugar Planting

3. Plants can be propagated generatively (by seeds). Obtained in this way will plant seeds in large quantities, so that it can easily develop (cultivate) sugar palm plants on a large scale.

The steps to be taken in seed collection and selection are as follows:

- Collection of palm fruit that meets the requirements.
- Comes from palm trees that grow healthy, have leaves.
- Ripe palm fruit (brownish yellow color and soft flesh).
- Large fruits (minimum 4 cm)
- Smooth fruit skin (not attacked by disease).
- Remove the palm fruit seeds that have been collected by splitting them.

Select palm kernels that meet the requirements:

- Relatively large seed size.
- Brownish black.
- Smooth surface (no wrinkles).
- Healthy / disease-free seeds.

What you need to pay attention to in the collection is the seeds containing palm fruit which, if oxalic acid gets on our skin will cause very itching. Therefore, this needs to be done in a preventive way, including:

- Wear gloves when you pick seeds from fruit.
- Make sure that our hands do not touch other parts of the body when removing palm seeds from the fruit.
- Another way to prevent exposure to palm sap is when we are removing the seeds from the fruit which is the first old parent palm fruit to rot.
- Curing can be done by putting the palm fruit in a wooden box and covering it with a burlap sack that is always wet.
- After \pm 10 days, palm fruit becomes rotten which will facilitate grain-decision.

4. Nursery

Seedlings can be done in two ways: from natural regeneration of seedlings and seeds from seed nurseries.

a. Procurement of seeds from nature/wild saplings

- The natural recruitment process is assisted by ferrets.
- Animals eat palm fruit and seeds and the seeds come out intact from the stomach in the feces.
- Seeds are scattered irregularly and in groups.
- To plant them in the field, you can do this by pulling out the rounds (seeds taken together with the soil).
- This can be a direct transfer of seedlings planted immediately in the field or through a weaning process by placing EFD seedlings in plastic bags (polybags) for 2-4 weeks.

b. Procurement of seeds through nurseries

To obtain seeds in large quantities with good quality, this is done through providing seeds for nurseries. Palm seed sowing process takes a little longer. Can speed up efforts to treat seeds before sowing:

- Soaking seeds in HCl solution with a concentration of 95% for 15-25 minutes.

- Soak the seeds in hot water temperature of 50 ° for 3 minutes.
- File the seeds at the embryo closure.

The seeding medium can be made with a plastic bag measuring 20 x 25 cm filled with compost, sand and soil 3 : 1 : 1 and a moderate hole at the bottom as a drainage channel. The treated seeds are placed in a plastic bag to a depth of about $\frac{3}{4}$ of the seed below the surface of the soil with the institution down to a slightly inclined position.

To achieve seedlings ready for planting in the field (size = 40 cm) requires 12-15 months of seeding.

Caring for seedlings in the nursery is carried out by:

Watering 2 times a day, in the morning from 8:00-09:00 and in the afternoon from 15:00-04:00

- Weeding the nursery, namely removing nuisance weeds.
- Eradication of pests and diseases, if there are symptoms of pests and diseases.

5. Planting

Coconut cultivation techniques can be carried out using a monoculture system or agroforestry system / intercropping. With the advancement of the monoculture system after clearing vegetation (land clearing) and cultivating the land by plowing or cultivating and making plant holes. Make planting holes measuring 30 x 30 x 30 cm and the distance between the holes (distance from) 5 x 5 m or 9 x 9 m. To accelerate the growth of the hole, the plant is given soil that has been mixed with manure, urea, TSP, around 3-5 days after planting the hole is prepared, new planting is done.

Newly planted seeds, they must be provided with protection or shade. Agroforestry/intercropping system, this can be done by naming the part of open land between two main crops with cover crops or crops such as legumes

6. Plant Maintenance

Sugar palm cultivation is successful with both adequate plant maintenance.

Caring for sugar palm plants includes:

a. Pest Control

Not too many people know about palm tree pests and diseases. However, as a preventive measure it is possible to know the pests and diseases that attack types of Palmae such as coconut, oil palm and sago palm.

Pests on Palmae plant species include the rhinoceros beetle (*Oryctes thinoceros*), sago beetle (*Rhinochophorus ferrugineus*) (grasshopper (*Sexava* spp)). Other pests for palm trees are sap and flower suckers such as bees, bats and civets. Pest control can be done by means of :

- Mechanically, palm trees can be cut down and burned by pests.

Chemical, by spraying certain pesticides such as Heptachlor 10 grams, 10 grams and BHC Diazonin. The type of disease that often attacks palm trees in nurseries is spots and yellowing on the leaves caused by *Pestalotia* sp. *Helmiathosporus* sp. Prevention of this disease can be done with fungicides such as Dithane N-45, Delsene NX 200.

b. Prevention of Plant Pests (weeds)

Plant pests (weeds) in coconut plants grow very disturbingly. Therefore, weed control must be carried out. Weeds on palm plants/trees are generally found in two places, namely on the axis (such as parasites and kadaka) and on the soil around the base regularly, namely 4 times a year until the plant is 3-4 years old. Technical eradication is carried out by mechanical means, namely by removing invasive plants from palm trees.

7. Fertilization

Fertilization is done to stimulate growth for faster growth. Fertilization is carried out on 1-3 year old plants by providing fertilizers such as urea, NPK, manure and KCL which are sprinkled around coconut tree trunks that have been loosened in the soil.

CONCLUSIONS AND RECOMMENDATIONS

This service activity is about the methods or techniques for cultivating landslide prevention plants in the River Basin (DAS) in Nagari Sungai Durian, Patamuan District, Padang Pariaman Regency. This activity is in the context of implementing the Tri Dharma of Higher Education under the auspices of the PGRI University of West Sumatra. It is hoped that this activity will make the community motivated and enthusiastic about cultivating plants to prevent landslides, especially in areas in the River Watershed (DAS).

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REFERENCES

- Arsyad Sitanala, (2010). Soil and Water Conservation, (Bogor : IPB Press, 2nd edition)
- Asdak, C. (2002). Hydrology and Watershed Management. (Yogyakarta: Gadjah Mada University Press),.
- Chiara De. Joseph and Kopelman E. Lee Site planning Standard. (1978). January translation Judge. (Jakarta : Erlangga)
- Irwan Djamal Zoer'aini, (1992). Community and Environmental Ecosystems, (Jakarta : Bumi Aksara)

Center for Forestry Development and Watershed Management LPPM-UNHAS,

(2002). Study Paremang River Watershed. (Forestry Department)

Salim Emil, (1986), Environmentally conscious development, (Jakarta: LP3ES)

Suripan, (2002), Conservation of Land and Water Resources, (Yogyakarta :Andi)

Siahaan, N.H.T, (1987), Development Ecology and Environmental Management
Law, (Jakarta: Erlangga)