The Fragrance of Aloe's Wood in a Dry Land

Oleh Nur Akhmad Yani
Mahrul was still young, only 35 years old, he was not a government official. He was just a farmer who lives on the edge of a forest and teaching Koran in his kampong. But his task was beyond of the officials in the kampong. Almost every day, he received numerous complaints from the community. Ranging from less fertile lands to economic difficulties.

"Ustadz (the title of religious teacher in Islam), why life has not been changed? We always live in poverty. We have lands, but couldn’t plant anything. Corn or beans couldn’t yield. Only cassava and it even yields after 8 months," complained one of his congregation.

Unfortunately, everytime similar question arose; the ustadz was unable to provide a solution. "Hopefully, God’s help would come soon; the important thing, we must diligently pray and try". That was the only response coming from UstadzMahrul. Although he knew praying was not enough. The ustadz, a Madrasah Aliyah’s graduate from one of Islamic boarding schools in Mataram could just only strengthen his congregation’s heart. Not more.

Mahrul himself wasn’t a wealthy person. His family lived in a hut out of bamboo with 20 square meters size, dirt floor and thatched roof. There were three rooms in the hut, two bedrooms and the other for the Koran study. Before marriage, Mahrul had already been a Koran teacher there. Since 1989, he gave regular lesson of Koran study to the local community.

Like most Sasak ethnic, there was "Berugaksekepat" in his yard. Berugak was a bamboo building usually used for receiving guests and also for other activities at noon. Sekepat is a building with four legs (epat is four in English). Some have six legs or BerugakSekem (enem is six in English). In Sasak tradition, the house is generally used only for sleeping, but for people who have small house, it is common that Berugak is also used for sleeping at night, like Mahrul’s.
Mahrun’s house itself was small, especially after he got married and his family grew each year. He was married in 1991. The following year, his first child died at the age of 4 months, and then six years later his third child also died at the age of four due to malaria attacks. Both were boys.

The village where Mahrun lived was on the hills, and directly adjacent to the protected forest of Sempeni, West Lombok. Since he had been living in the kampong, the thing that concerned him most was the condition of education. In the kampong it was really rare for children to go to school. The nearest elementary school was five kilometers away, 1.5 hours of walking distance. The road was in very bad condition. No ojek (motorcycles taxi used for public transportation) was willing to take the route.

Upon seeing this condition, ustaz Mahrun’s heart was moved to provide free education for local children at his house. In 1995, there were 15 kids who were interested in learning with him. He taught them general and religious lessons in the morning and evening in his hut and Berugak. Half of his students stayed at his house.

The number of his students grew each year. In July 2002 the local government got interested in his activities and built a filial elementary school in the village.

The number of students at that time was 60 people. Mahrun eventually became a permanent teacher there.

The houses in the village were scattered, located at the top to the sides of the hills. The village is directly bordered with the protected forest of Sempeni, in Penimbung village, Gunungsari District. The area was part of the territory of Forest Management Unit of West Rinjani that extended to 40,983 hectares, from the west region of Lombok Island till Bayan District in the far east of Lombok Island.

The land in Mahrun’s village was used to be fertile, but because of the sloping topography, sandy soil texture and the land management system that left out conservation technique, the top soil of the land which contained humus gradually eroded and gone.

Although the area is directly bordered with the protected forest, the condition of the land was not fertile anymore. The black, top soil had gone, leaving only sandy soil with pumice-like color, bright dull. Based on the story of Mahrun’s parents, since he was a child, the land had already been in the critical conditions like that.
The livelihood of most residents in Penimbung Subdistrict was dry land farmer. They had lands ranging from 10 ares or 100 square meters to 1 hectare. Mahrur himself had an area of 1 hectare. Just like other lands owned by the community, his land was also on a slope with over 40 degree angle, unproductive dry soil, unable to hold water because it contained lot of sand.

He could only cultivate his land once a year. And it was only during rainy season. The crop that could be grown was only manioc or cassava. And it could only be harvested after reaching the age of 9-12 months. If cassava was harvested and sold, at most he would get 1 to 1.5 tons from 1 hectare of his land, with a selling price of Rp. 500 per kilo.

"They know the activity can damage the environment," said Mahrur. But his neighbors had no other choice, they needed to eat. He himself believed that the root of the problem was the low family income.

"It is even difficult to buy rice, let alone buy side dishes. That is why there are many malnourished children under five here. This village is categorized as undeveloped village," he said, confused. As one of community figures, it was no wonder that he felt troubled. He often thought about the environmental conditions and the poverty of the community, including his own family.

Luckily he had some sugar palm trees that helped meet the needs of his family life. Every day he made incision on the trees to obtain palm tree sap for his wife to cook, so that it would become palm sugar. Every day his family could sell 10 pieces of palm sugar at a price of Rp. 3,000 per piece. But not all farmer families there had sugar palm trees.

Residents there did not have many options as to how to meet the daily needs of the family except by cultivating the land. There was other option, but it was a violation against the rule. Entering the protected forest which borders their village, taking the timber and selling it. Economic reason had made the community to encroach the forest.
By involving the community surrounding the forest in the reforestation program belonged to Forestry Office, aside from increasing the community’s incomes, it was also intended for making active engagement of the community in the future to preserve the forest, especially the main timbers in the intercropping area where they were managing. The pressure to the forest area in Gunungsari District was strong enough, considering in this area there were many sawmills, and they were known as suppliers of timbers for building materials in Mataram City and surrounding areas.

Mahrun was not alone. There was Sahli who had similar stories. Sahli lived in Batu Kemalik Kampong, Tunjang Polak Sub Village, on the same village as Mahrun’s. The distance between Sahli’s kampong to Mahrun’s was 9 kilometers. Sahli’s kampong was adjacent to the protected forest of Batu Kemalik.

Sahli was two years older than Mahrun, he was also an ordinary farmer. His education was only until primary classes. He married in 1976, had four children, his second child died at the age of one year due to an illness. He lived in a hut with bamboo wall, dirt floor and thatched roof, without any partitions. He also had a "Berugaksekepat" out of bamboo.

Having seen the forest damage that was getting worse and to rejuvenate the bare forest, in 1995/1996 the Forestry Office of West Lombok Regency launched reforestation activities which involved the communities surrounding the forest. It covered 50 hectares area in Sempeni protected forest and 200 hectares area in Batu Kemalik protected forest. The community was allowed to intercrop in the protected forest area, as long as they were willing to preserve and maintain the main timbers. Mahrun got an allotment of 25 are.

"With this intercropping program, we can use the land for growing seasonal crop to meet the needs of daily life until the next 4 to 5 years, before the timbers get tall and have dense shades," said Mahrun.
Batu Kemalik Kampong had the same condition as Sempeni Kampong. In Batu Kemalik, there were many children who did not go to school because the distance to the nearest primary school was quite far away, a 1.5 – 2 hours walking distance. And the road was also in very bad condition.

Sahli was used to be an active youth. He was listed as a cadre of Integrated Service Station (Posyandu) since 1990. In those days, it was very rare for a man to be a volunteer in Posyandu. Usually the cadres in Posyandu were single women. Sahli was known as a sociable, smart, and helpful man and always interested in new innovations.

Sahli had 27 are of land with angles of above 40 degree. About 7 are of land were planted with sugar palm trees, and the rest were planted with seasonal crops. The soil condition in his land was the same as of Mahrun: arid, unproductive, high erosion rate, soil texture is dominated by sand.

Seasonal crop that could grow optimally in Sahli’s and surrounding land was cassava. Sahli could earn Rp. 100,000 a year from an average of 200 kg of cassava yields, and Rp. 90,000 a month from selling his palm sugar. Of course, this result could not make ends meet every month.

Besides farming, Sahli was also known as aloe wood hunter. Since 1988, he used to hunt aloe in the forests, not only in the island of Lombok, but also to the island of Sumbawa. He knew aloe wood from his friend who lived in the neighboring village, Orong Village.

Aloes wood is considered as a rare tree, included in the appendix 2 groups. This tree can produce a resin which yields fragrance. It has long been commercialized and became material for perfume industry, cosmetics, joss sticks, incense sticks, incense and medicine. However, until now the aloes wood resin production is still very conventional. It just depends on natural aloes wood resin, without any technological touch.
Formerly in the area around Sahli’s house, there were many aloes woods. This plant is highly in demand. "The price of aloes wood resin is quite high, in the market it is between Rp. 5 – 15 million per kilogram for super grade resin," said Sahli. When people knew that aloes wood resin has a high economic value, they went hunting for it in the forest. If they found aloes wood, they would immediately cut down the tree and looked for the resin even till its roots, though not every aloes wood produce the resin.

The lack of skill of aloe hunters in recognizing which tree had formed a resin made the logging become useless and aloes wood population shrunk drastically. This is the beginning of the scarcity story of aloes wood.

At that time, aloes wood could not be cultivated outside the forest area. It had not yet been found a technology of aloes resin production. During breaks and small talks with his friends while intercropping, Sahli often recalled the condition of the forest around his residence. "The forest we are managing now was once a dense forest. Many native plants and animals grow and roam here, such as Kowak-Kaok (herons) and aloes wood, but they are not found anymore now."

"I used to cut a lot of aloes woods. Each time I found them, as long as they were woody, I would cut them down although the diameter wasn’t yet too big. I would chop the inside of the tree to get the resin. But not every tree has resin in it although it was a teen-aged tree. Often, I injured the tree I met by chopping its stem, hoping fungi would enter the wound, and it could form resin after 6 – 12 months," recalled Sahli about his past.

When aloes wood became rare, Sahli didn’t have fixed income anymore. The land he owned didn’t help him much to support his four children. To meet the needs of the household, Sahli and most other villagers could not help themselves to fell timber in the forest. He could sell 3 logs in a week.
Sahli had also become a migrant worker in Malaysia for 4 years. He went to Malaysia with 12 of his friends. In Sahli’s kampong, there were always some people who went abroad as migrant workers every year. Having come home from Malaysia, Sahli bought a 27 ares land to supplement his farming land.

"The only remaining reminiscence after becoming a migrant worker is the land," recalled Sahli.

When there was the reforestation program from Forestry Office in 1995, Sahli and other Batu Kemalk residents opted to join the intercropping program in the forest area. Sahli got 50 are allotment. Because the land condition was still fertile, he could grow corn and peanuts in the location. This condition sufficiently helped his family. He and his friends realized though, that the intercropping crops could only be benefited until the 4th or 5th year only. After the main timbers became big and had dense shade, they could no longer grow crops.

In October 1996, I visited Mahrun and Sahli. It was not our first meeting. We had met and worked together in a project on mother and child health facilitated by an International NGO in 1990 – 1993 before. That time, Mahrun was a religious figure who sat as Village Council Team, Sahli as a cadre of Posyandu and I as the project field staff. Infant mortality rate and the number of malnourished children under five in Penimbung Village were classified as high. The number of children under five who visited Posyandu was still around 20 percent.

When re-visiting the village, after three years of the project, it turned out that the number of malnourished children under five that had been controlled during the project was high again, due to poverty.

Actually my visit to Penimbung was not just to meet Mahrun and Sahli as friends. Since my early contact with the community in this village, I realized that the root of the problem was poverty. If the case of malnourished children under five were approached by short term program (health) only, without being coupled with long-term programs such as increasing family income, then the program will be useless. The children who had gained normal weight would suffer malnutrition again if they were returned to their family.
There should be a high economic value crop that could be cultivated on a dry land, so that it could boost the income of dry land farmers drastically, making their income equals to the income of wet land farmers.

In mid-1996, information came from a friend who studied at the Faculty of Agriculture, University of Mataram. He told me that his lecturer had managed to manipulate the formation of aloes wood resin. "The 2 years' trial conducted by Dr.Parman has shown visible result on site," told Lalu Kertawan that I remember most.

It was like hitting the jackpot. I had been dreaming about it for so long: a high economic value commodity on a dry land. The good news made me excited, and started looking for a way to meet and discuss with Dr.Parman.

"During this research, I have identified 52 species of fungi and bacteria found in the natural aloes wood resin. Apparently from lots of fungi and bacteria, only one type of fungus (Fusarium sp) which can cause the aloes wood to blacken and smells sweet.

It is the fungi that I then isolated and cultured in the laboratory as a stock culture for aloes wood resin," explained Dr. Parman, at the first meeting.

"Previously, aloes wood resin could only be found at certain part of the tree, usually in the wound of the tree, enabling the Fusarium sp to infect and then the tree makes a resin around the infected area, but currently, all part of the tree from stalk to root can produce resin wherever the yeast/seed culture is inoculated," continued Dr. Parman at that time.

It looked like this was the answer to my dreams. There was a glimmer of hope to boost the income of dry land farmers. The crop with high economic value and the technical engineering for producing aloes wood resin have been found. It was about time to try aloes wood cultivation on a dry land, because the plant could only grow and thrive in humid areas. I was happy imagining the future success of the pilot.
That was the reason of why I determined to meet Mahrun and Sahli, although that time I came without any program nor any help from any donor. I asked them to make demonstration plot of aloe wood cultivation on their land independently and to motivate local farmers to try it also by groups.

Mahrun and Sahli were very interested and enthusiastic to try. Moreover Sahli was formerly an aloe hunter, he was very well aware of the profit if they succeeded on cultivating the aloe wood. While Mahrun who had not seen the aloe wood himself, but had often heard the fame of aloe wood, was curious to try.

Both of them started to disseminate and hold meeting with the community in their kampong for outreach. "Our prayers were answered. By the grace of God, there is a way to change our lives. But we must work hard. We must struggle in working our lands. At least we will see the result in a year," said Mahrun at one of his Islamic lecture in his village.

"How come, Ustadz?" asked one of his congregations. Mahrun then explained about the idea of cultivating aloe wood on dry land. He advised the congregation to immediately begin setting up the land, as the rainy season would come soon. Mahrun also introduced me to his congregation.

"This is Mr. Yani, he has helped us in facilitating the institutional strengthening of Posyandu in our village. He will assist us in this activity," continued Mahrun.

Besides in Sempeni, dissemination of the program was also done in BatuKemalik kampong by Sahli. "Dry Land Agriculture Management Program we will carry out is very different from what other people has done, because here we will cultivate aloe wood outside of forest area. The cultivation of aloe wood that we have already known for so long will help us to change our lives and our generations," said Sahli at a meeting with farmers in his village.
Unfortunately not a lot of people buys in. According to them it was impossible to change an infertile and unproductive dry land into a productive land. Another reason, “Better to intercrop in the forest with obvious result than to struggle with unknown result. Now we plant, four months later we harvest.”

It turned out that the response from the community didn’t dampen the spirit of these two farmers. “It is better if we make the demonstration plot by just the two of us, with the assistance from Mr. Yani. Who knows after seeing our success, the community will follow our steps,” offered Mahrun to Sahli. His friend agreed.

In early November 1996, Mahrun and Sahli started to work their lands, made demonstration plot on their respective lands. During working intervals, both of them always asked about what would be the next activities and steps to do.

The first step we did was to make terrace ridges on the hill slope according to the height using “Frame A” tool made of bamboo. These terrace ridges had points with equal height above sea level.

The terraces they made were different from the usual terraces made by the community. Usually Mahrun and Sahli’s neighbors made terraces by pulling straight line.

But their terraces were different because the terraces followed the height or the contour. The results would be winding, thus in case of erosion either because of soil or wind erosion, the top layer of soil that contains humus would not slide down being washed away, and the erosion would not destroy the terrace ridges as it usually happened. The fertile soil will be retained at the lower terrace ridge, so the soil fertility in the land was still maintained.

After the terrace ridges was finished, Sahli and Mahrun planted the terrace ridges with Gamal (Gillicideamaculatta), a terrace strengthen tree. Gamal is a pioneer tree of dry land. If the tree thrived, you can bet other cultivated trees could thrive too. And conversely, if the tree died, other tree would not thrive also.
Gamal has many functions. Gamal leaves could be used for green fertilizer. The stem could be used for firewood. The roots have nodules which contain “Rhizobium” microbes to enrich the soil. In the dry season, gamal leaves could shade or protect the crops underneath from the sun. And one more benefit of gamal, the tree could become fodder, so that the community had no trouble to find fodder or they need not herd the cow into the forest to feed it.

On the land or on the spaces between two terraces, Mahrun and Sahli planted food crops, second crops and medicinal crops. To strengthen the terrace, they planted forestry tree or perennial tree such as sengon (Paraserianthesfalcatoria), mahogany, gamelina (Gmelinaarborea) and teak in parallel with the rows of gamal. Later the wood from the trees could be used as firewood or boards.

Gamal trees should be treated routinely. At the beginning of the rainy season, when it was about time to plant seasonal crops such as upland rice, second crop or medicinal crop, the stem of gamal should be cut until only about 50 centimeters remained, so that the seasonal crops could get enough sunlight. The gamal leaves could be scattered or buried in the land as fertilizer.

Usually when the seasonal crops were harvested, gamal had already grown taller and it could overshadow other trees below it during the dry season. If done continuously this cycle would fertilize the land. Soil fertility could also be accelerated by placing a movable cowshed on the land so that cattle dung and urine could fertilize the land underneath.
Dry land farming management model developed by Mahrun and Sahli had been introduced a long time ago actually by Nusa Tenggara Community Consortium (KMNT). The consortium was composed of NGOs, farmer groups and other stakeholders in NTB, NTT, Bali and East Timor (prior to its separation from Indonesia) that were concerned with the development of upland communities. This model had many names, some called it Dry Land Farming Systems, Agroforestry, Silviculture, Sustainable Agriculture, The Tree Strata Agriculture, or Lined Fences.

The difference between the models was that in Mahrun and Sahli’s aloe wood was cultivated as the pre-eminent crop which had never been cultivated on dry land before, while the other model usually had fruits or other MPTS (multipurpose tree species) such as chocolate, coffee or vanilla as the pre-eminent crop. The result of the model had proved to increase dry land farmers’ income, but it had not yet leverage the quality of farmers’ lives.

At the end of November until December 1996, after terracing and gamal planting were completed, it was time for us to plant the seeds of aloe wood along the terrace under the shade of gamal, which will protect it from the sunlight during dry season. At that time, there were about 400 aloe wood seedlings grown under the rows of gamal trees.

Seed provision was also another struggle. The struggle was not less heroic than the effort to invite Sahli and Mahrun’s neighbor to make demonstration plots. As many as 400 aloe wood seeds with the price of Rp. 1,000,000 were obtained by loan.

When I offered myself to assist Mahrun and Sahli, I was in the condition of financial trouble actually. Moreover, the remaining money had been spent to pay the house contract. Fortunately, my wife was working, she was a lecturer at a college in Mataram. It could be said that it was my wife who assist the pilot of aloe wood cultivation on the dry land indirectly.

If I thought about this, it was impossible the pilot of the three of us could run well without mounting determination and spirit. Why? Because transportation cost is needed to come regularly to the Penimbung district. The road to Mahrun and Sahli’s village could only be passed by motorcycles. We even had to be careful, because the macadam roads made by the community were often damaged and difficult to pass by a motorcycle. People sometimes preferred walking to go to their houses.
Fortunately, there was always a way. I was allowed to borrow the motorcycle of my wife's student. After I transported them to campus, I then could go to Penimbung. At noon I had to return to the campus to pick up the motorcycle's owner. This happened for almost a year.

I then thought, if I wanted to expand the demonstration plots to another village, I could no longer rely on loans and a borrowed motorcycle. I also could not do this alone. I needed donations. Apparently, an organization was needed to get donation; it was difficult to get donation for individual. Finally, on January 11, 1997, I and several friends founded the Institute of Study Center and Human Resources Development, abbreviated PSPSDM.

In February 1998, the Global Environment Facility - Small Grant Program (GEF-SGP) willingly funded the program development. This activity had expanded the demonstration plots from two families to 40 farmers families, with 20 people in Lilir I Hamlet and 20 people in Tunjang Polak Hamlet, with Mahrun and Sahli as chairman of the groups.

From the pilot with Mahrun and Sahli, there were lots of important lessons we could learned as an asset for program development. We found that the aloe woods which planted on marginal land could grow but they didn't grow tall despite being planted for 5 years. The pilot also succeeded in proving that planting aloe seedlings under the shade of gamal can retain the soil moisture around the seedlings, provided with the addition of mulch from gamal leaves, banana stem and other leaf litter; or by using a drip watering system whenever it was possible.

Mahrun and Sahli's neighbors soon began interested in joining the farmers groups, because they had seen the success of the program. Mahrun and Sahli's lands that were used to be barren were now green within a year. Seasonal crops and woody tree that were used to be unable to thrive in the lands were now thriving. They also saw that both of Mahli and Sahli didn't need to search for fodder in the forest. Moreover, aloe woods could be planted on the same land.
Now the demonstration plot program had spread to other than Mekarsari and Bukittinggi village. Their neighboring villages, Gelangsr and Mambalan had also adopted this program. Mahrun who lived in Mekarsari village and Sahli in Bukittinggi village became supervisors and resource people for aloes wood cultivation on dry land at their villages.

PSPSDM had expanded the program to Pringgabaya District in East Lombok Regency (2000) and to Donggo District in Bima - Sumbawa Island (2002-2005). There were many farmers and governments from other villages visited Penimbung which has become a training and field laboratory for organizations interested in the management and development of dry land agriculture.

Not only from Lombok, this laboratory had also been visited by NGO, government and farmers from the province of West Nusa Tenggara, East Nusa Tenggara, Java and even East Timor to do a comparative study and learning with farmers.

After 12 years had passed, Mahrun and Sahli could smile now. Their efforts and patience was not useless, even it was useful to others. The stretch of lands in their hamlets that was once dry turned lush. Seasonal crops and woody tree were already harvested. Aloes woods with resin engineering were also successfully harvested. They could buy cows, motorcycles, repair their houses and even send their children to school in the city.

Unfortunately, the price of aloes wood was still low, around Rp. 300,000 - Rp. 600,000 per kilogram. Most buyers who came were local traders who bought at low prices. They hoped there were wholesalers who wanted to buy with high price, so that there would be many more farmers who would follow their steps, restoring soil fertility and preserving aloes wood as well.

"Li...., hopefully we can become aloe Haji as we have been dreaming when we planted it," said Mahrun when Sahli and I visited him in his house. "Amen Ustadz", Sahli said.

I am sure, the fragrance of aloes wood would soon make their dreams come true.
Nur Akhmad Yani

He is called as Yani. This 46-year-old man has a dream to reforest Nusa Tenggara region through aloe wood. His struggle and dream was not in vain, in 1999, the GEF SGP Indonesia supported his struggle. The small groups he helped facilitate keep growing from two groups to four in the village. West Nusa Tenggara, known as dry land area is now green and local economy is improving.