PARTICIPATORY IRRIGATION DEVELOPMENT AND MANAGEMENT IN THE SAVU-RAIJUA ISLANDS

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Abstract

Small reservoir (embung) system has been developed in The Savu-Raijua Islands and has positive impact on increasing food production and environment, but some embungs are not functioning well, due to poor maintenance and unclear institutional arrangement. This paper is intended to present Pro-Rainwater Management for Agriculture (Pro-RMA), as a model to improve irrigation and drainage efficiency through participatory approach under small land holding conditions. The development of the model was based on the lessons learned from previous embung system development in Nusa Tenggara Timur Province. This project has a positive impact to local economic development and environmental quality. However, unclear institutional arrangement of the system management results lack of operation and maintenance, and consequently the embungs are deteriorate in very short time. Rainwater harvesting to support agriculture development in The Savu-Raijua Islands should be developed from the local technology. Farmer participation from the beginning in planning, implementation, and management is a critical factor for the success of the project. Institutional arrangement and human resources development should be done in line with infrastructure development for rainwater harvesting. Sense of belonging of the people should be built gradually through their involvement in the project development. Non government organization (NGO) and local government officers should work together hand-in-hand to facilitate the process, both in technical aspects as well as in institutional development.

Keywords: participatory management, small reservoir (embung), operation and maintenance

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Background

Savu and Raijua Islands, are more known as in the united, outer small islands in East-Indonesian Region, with the area of 424.15 km^2 and 36,97 km^2 (Figure 1). The two islands become as new regency, called as Savu-Raijua Regency, Nusa Tenggara Timur Province. These islands are naturally semi arid region with few rainfall, where cumulative annual rainfall about 1,000-1,500 mm, occurred during 3-5 month. Sucipto et.al (2007) reported that in Savu and Raijua Islands, the average annual rainfall is 1,200 mm, with 4 month wet season and 8 month dry season. This low rainfall causes drought hazard as it was experienced in 2004 (BMG, 2008).

In general, topographical condition of these islands consists of lowland region with the elevation between 0 – 100 m above the mean sea level (MSL), and upland region with the elevation between 100 – 350 m MSL. The lowland regions are located on the north-eastern part area and part of south-western area, while the upland regions are located on the middle part of the island with the position tend to the southern part of the island.

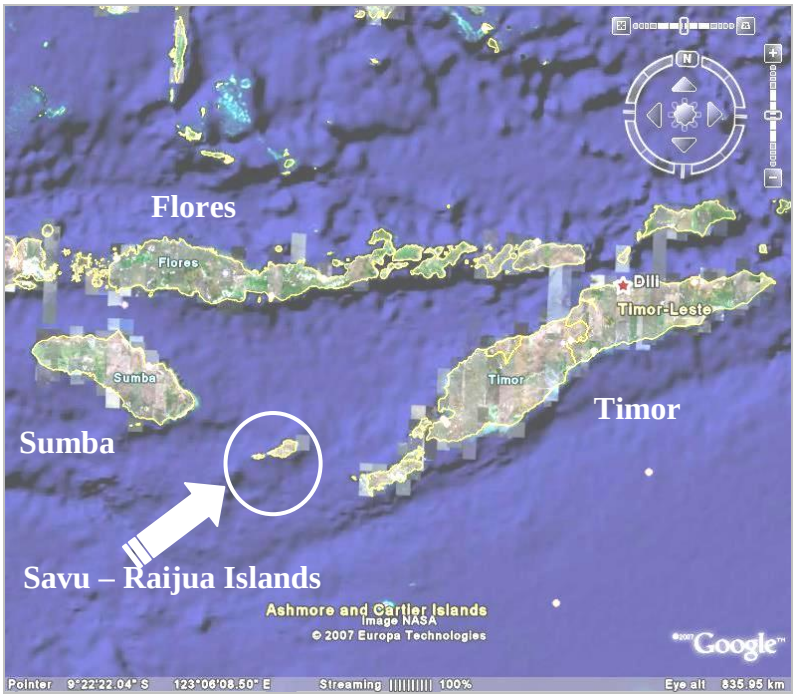

Figure 1 Savu and Raijua Islands between Timor – Sumba – Flores Islands (Google Earth, 2009)

Evaluation of Small Reservoir System Development in The Savu-Raijua Islands

Since 1993 up till now, *embung* or small reservoir system has been developed in the Savu and Raijua Islands to cope the water scarcity. There are 3 irrigation *embungs* and 30 small *embungs* which have been built in the Savu Island and 3 small *embungs* in the Raijua Island which have been built by the Ministry of Public Works. Local government has also built 17 small *embungs* in the Savu and 4 in the Raijua islands. Ministry of Forestry has also built 5 conservation *embungs*. So the number of *embungs* in the Savu island are 55 units, in the area of the island of 423.81 km^2, which means that in average one *embung* covers an area of 7.7 km^2. For the Raijua Island, there are 7 units *embungs* for the area of 36.97 km^2, or in average one *embung* covers an area of 5.3 km^2 (see Figure 2).

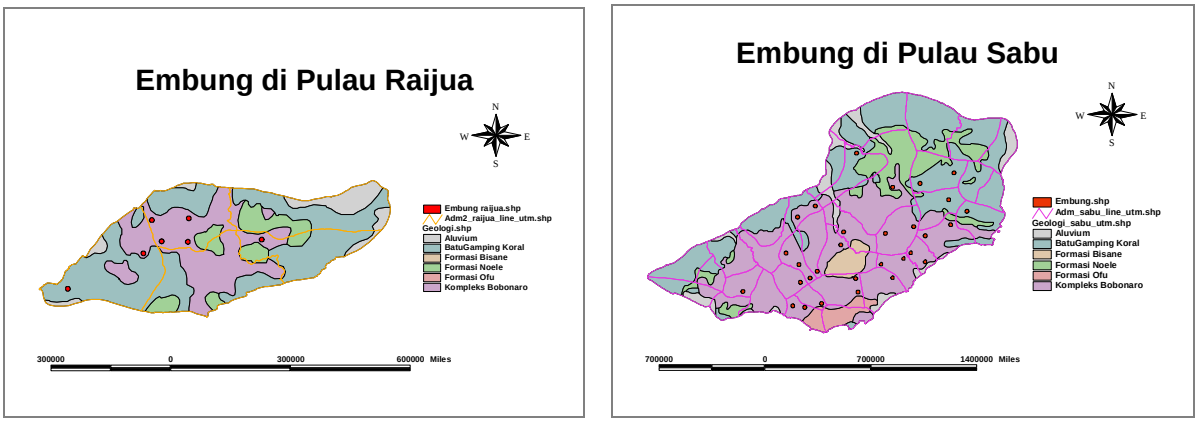

Figure 2 *Embungs* in the Savu and Raijua Islands (Susilawati, 2009)

The development of these *embungs* has positive effect on increasing food production and environment. Figure 3 indicates an increasing of food production, as a result of *embungs* construction. Unfortunately, several years after its construction, food production decreases again due to poor and unclear operation and maintenance of the *embungs*, As a result, these *embungs* became dried and failed to function, for high evaporation rate. High level of erosion in the catchment area has caused high level of sedimentation, which decreases the capacity of the *embungs* in storing water.

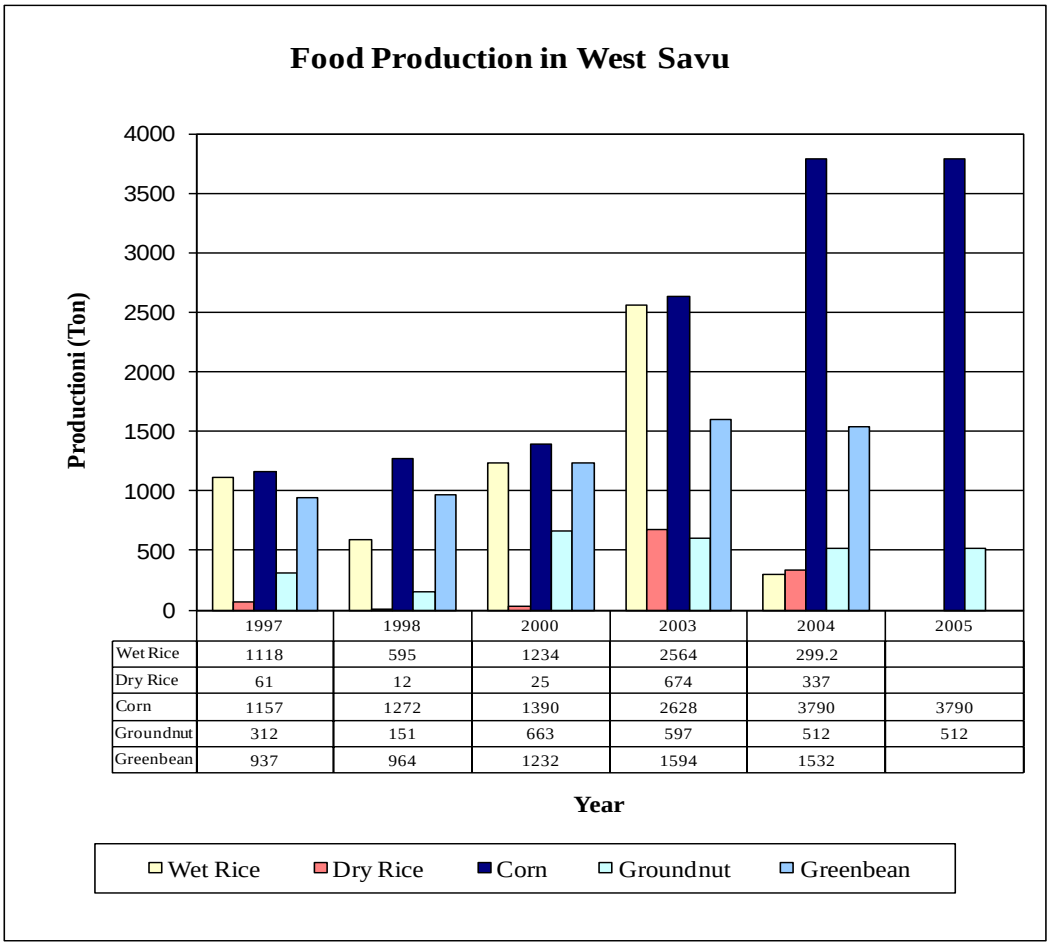

Figure 3 Food Production in West Savu (Statistic of Kupang Regency, 2006)

The positive impact of the e*mbung* developments is the increase of the environment quality by decreasing of the critical lands in Savu Island (Figure 4).

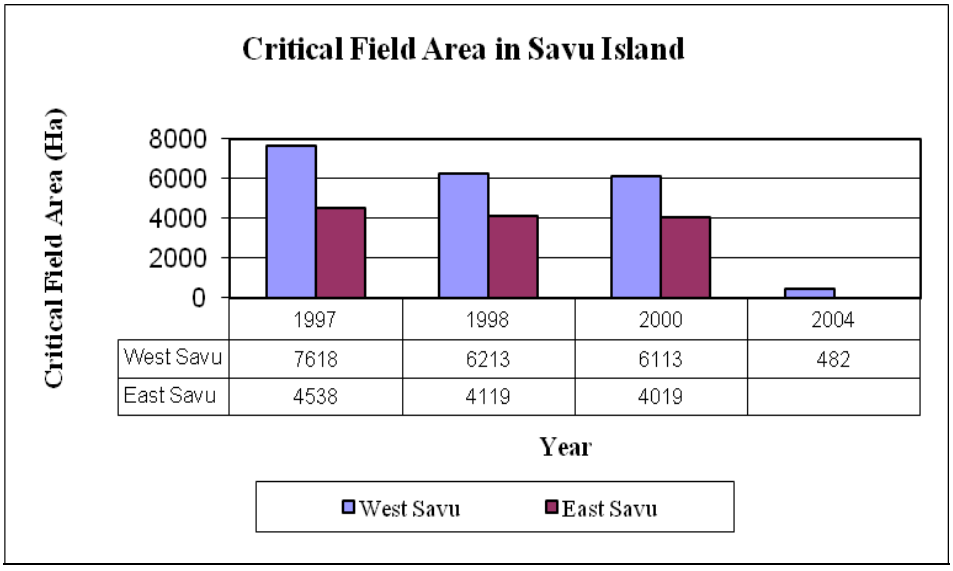

Figure 4. Critical Lands in Savu Island (Statistic of Kupang Regency, 2006)

To crystallize the lessons learned from previous *embung* system development, an analysis was done on some relevant aspects in water resources management, which covers infrastructure system, operation and maintenance, institution, community building, information system, and value of water usage. From the analysis some findings can be mentioned. First, *embung* system development has positive impact to the economic condition of the local community in the Savu and Raijua Islands. However, some critical aspects should be considered such as formulating the target of service, water balance and reservoir capacity, and potential of sedimentation rate. Second, operation and maintenance of the *embung* is very important aspect for its sustainability. The lack of operation and maintenance will cause the degradation of the structure in a very short time after construction. Third, institutional aspect for the operation and maintenance should be clearly designed from the beginning. In addition, human resources capacity of the local people who will operate and maintain the embung system should be developed. In summary, it can be said that *embung* system development in the Savu and Raijua Islands is a central government project, but local government officers did not involve in the project management. As a result, this project is lack of support from the local community.

The lessons learned from previous *embung* development is that involving local community in the process of technical design, construction, and management, is very important. Community participation in all process of *embung* development will assure the sustainability in implementing this technology.

Operation and maintenance activities consist of arrangement, action, monitoring and evaluation of *embung* structure that has been constructed. From 62 *embungs* constructed in Savu Island, 36 units are from the Ministry of Public Work budget (3 units are irrigation *embungs* and 33 unit are small *embungs*), and the rest from local government project. The 33 units small *embungs* have no irrigation network, so only farmer around *embungs* which can

irrigate crop by taking water directly and manually from the *embungs*. Unfortunately, these structures are not maintained well, and even 6 *embungs* have been already full of sediment (PPSA-NTT, 2008).

One of the weaknesses in *embung* development in NTT is that after its construction the central government did not hand over the *embungs* to local government. This situation has created institutional problems, about who is responsible for the operation and maintenance of the infrastructure. As a result, most *embungs* are neglected soon after their construction completed. Even though a person has been assigned in the operation and maintenance of the *embungs*, but difficulties in transportation system become a constraint in maintaining the *embungs* which are located in remote areas.

The other 26 unit small *embungs* which were constructed by local government budget, can only be used for agricultural field around the *embungs*. Farmers irrigate their crop by taking water directly and manually from those *embungs*. There are no maintenance activities, and even outlet pipes of the *embungs* are stolen. These small *embungs* are neglected soon after the construction, so in the short time *embungs* already damage and not function again (Susilawati, 2009).

The organization structure, which responsible for the *embung* development systems in the East Nusa Tenggara (NTT), especially in Savu-Raijua Island, from the year of 1993 until 2008, have changed every year to adjust with new internal and external situation. The *Embung* Irrigation Project of NTT is known in the year of 1993-1995. This organization is formed for *embung*s development in NTT for coping water scarcity problem. Then, The Water Conservation and Development Project of Timor was established in the year of 1995-1998. The establishment of this organization is intended to response the high demand for water conservation in Timor in coping the problem of drought. This organization was readjusted again to include Sumba Island, and known as The Water Conservation and

Development Project of Timor-Sumba, in the year of 1999-2002. In the year of 2002-2004, this organization was known as The Water Resources Management and Development Project of NTT (PPSA) to cover the water resources management and development for the whole NTT Province. Then, in the year of 2005, it was changed again as Temporary Working Unit of PPSA-NTT, for more optimal PPSA institution that consists of several islands. In 2006, this organization was changed again as Specific non Vertical Working Unit (SNVT PPSA-NTT). This changing was done for more effective coordination needed in the water resources management. In 2007, this organization was changed as Working Unit of Nusa Tenggara II River Basin Bureau, under the activity of PKSDA-PPK (Water Resources Conservation and Development-Commitment Maker Official). Later, in 2008, this organization change as known as Water Resources Management and Realization SNVT of Nusa Tenggara II, NTT Province, under the activity of PKSDA-PPK (PPSA-NTT, 2008).

Actually, the organization or institution that is responsible for operation and maintenance of *embung* system development always changes, which indicates the changing of planning, implementation, and management of the *embung* system.

Continuous changes of organization structure of the *embung* system development indicate that planning, implementation, and management of the system always changes from time to time. Consequently, there is an ambiguity among the involved people. Lack of transportation and communication facilities become a constraint in daily implementation of the organization system.

Participatory Irrigation Development and Management under Small Land Holding Conditions

Participatory irrigation development and management under small land holding condition is a good solution to cope the problem in Savu-Raijua Islands about operation and

maintenance. From that participatory irrigation development and management under small land holding conditions, it can be built a model management for sustainable operation-maintenance which is known as Pro-Rainwater Management for Agriculture (Pro-RMA).

Pro-Rainwater Management for Agriculture (Pro-RMA) is a model for the improvement of irrigation and drainage efficiency, through participatory irrigation development and management under the small land holding conditions. By this model approached and lessons learnt from the failures of government operational system, the development and application of effective service partnerships between government irrigation agencies and water users associations and their federations (WUA/WUAF) under the small land holding conditions could be achieved.

The developed organization structure of the Pro-RMA is based on Acts No. 7 Year 2004 about Water Resources and existing organization structure in the Ministry of Public Works in 2008. Hopefully, this structure could support the sustainability of operational system. The operational system is developed with assumption that people participation fully exist in planning and construction process. It will give a sense of belonging to people, which will be helpful in operation and maintenance system process arrangement. This system grows from the people, between the people and for the people.

People participation model will be done in unity of people and self-help institutions which can be divided into two teams, social and technical teams. Social team will be responsible for preparing people from the beginning until formation and supervision of water institutions. Technical team will be responsible on detail engineering design (DED) and construction activity. This model called as Pro-RMA model, in which people take participation proactively as aspirator, planner, and O&M personnel of RMA structure. As presented in Figure 5, organization structure of Pro-RMA model is under a supervision of Water Resources Management Affair – Timor (PPK PKSDA Timor Supervisor). This

structure consists of 3 divisions, i.e planning, construction, and O&M division.

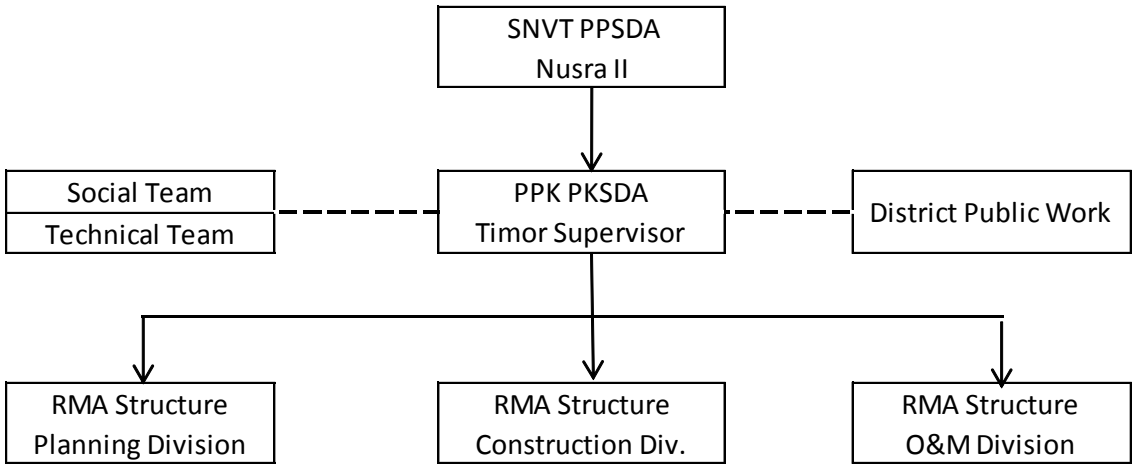

Figure 5 Organization Structure of Pro-RMA Model

RMA Structure O&M Division responsible to the water institution system, which is developed based on existing traditional institution system in the study area, where farmer groups are exist. The arrangement of water institution is illustrated in Figure 6. The Water User Association in coordination with District Public Works, Social Team and Technical Team. District technical team has a role as personnel who make decision according to the simulation result of RMA-DSS about when the first planting date to be done. District social team has a role in the socialization and communication about management decision. The leader of RMA structure and dug-well network in level of village area has coordination, so that will make integrated role in the management of RMA in macro and micro systems, also in the level of field area. The evaluation system is done continuously in the level of district, village, sub-village until farmer.

For financial affair, there are also in the level of macro and micro system, which called as financial affair and personnel financial affair. Farmer has to pay the cost of O&M, especially for the operation and maintenance of RMA structure. There are no operation and maintenance cost for dug-well network, because these structures located in the farmers field, where farmer did the operation and maintenance by themselves.

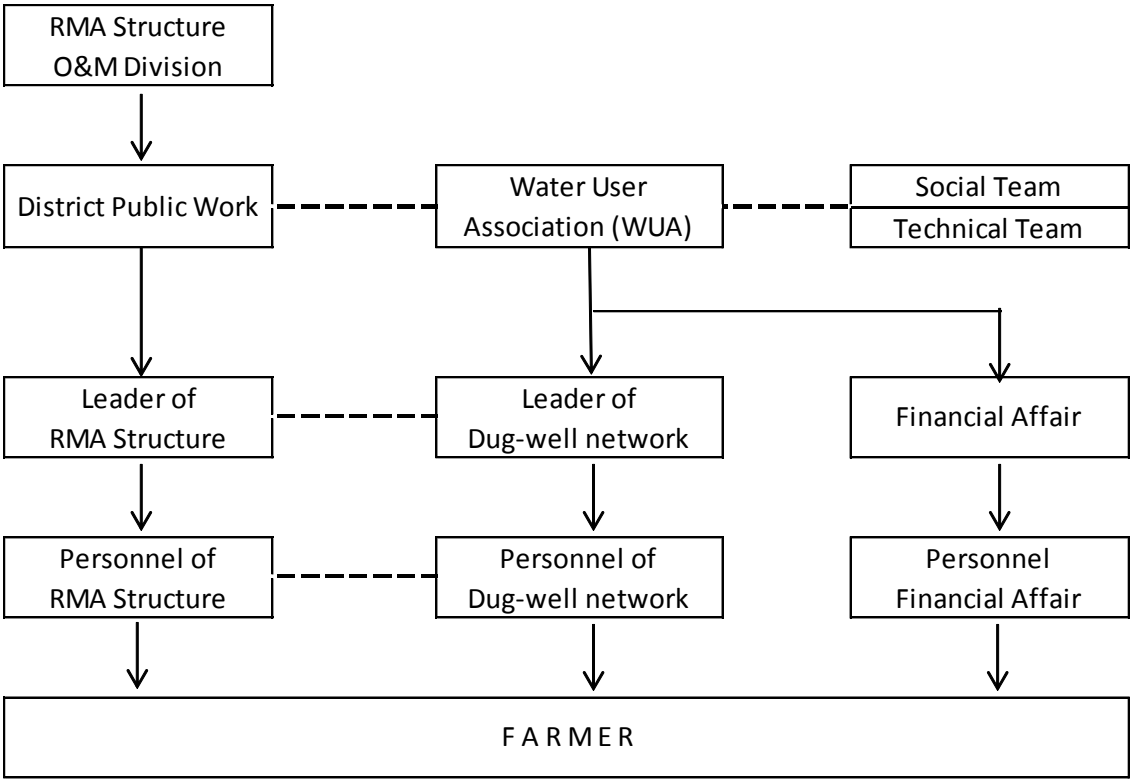

Figure 6 Water Institution Organization Structure

Conclusion

From the above discussion, it can be concluded that:

1. The lessons learn from the previous *embung* system development is that involvement of local community in the design, construction and management, is very important for the sustainability of the system development.
2. Organization or institution that responsible for operation and maintenance of *embung* system development always changes, to adjust with internal and external situation.
3. In the Pro-RMA model, farmers should actively participate through the social and technical teams, and involve in formulating the concepts, planning, design, construction, and operation and maintenance of the rainwater harvesting system. In this process, NGO and local government have the role as facilitator.

4. The development and application of effective service partnerships between government irrigation agencies and water users associations and their federations (WUA/WUAF) under the small land holding conditions could be achieved.

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