



PARTICIPATORY IRRIGATION MANAGEMENT IN KELARA KARALLOE IRRIGATION PROJECT, SOUTH SULAWESI, INDONESIA

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ABSTRACT

Despite the rapid industrialization in Indonesia over the last few decades, irrigation development for paddy remains a strategic endeavor for enhancing the nation's food security program, in particular, and stability of agricultural productivities in general. This is particularly the case during the effort of the government to recover the multi-dimensional economic crises since 1997.

In an attempt to support sustaining irrigation development and management, for acceleration and stabilization of food security while maintaining appropriate level of agricultural production, the government has given special scrutiny on management of the existing irrigation scheme while pursue some selected development for new schemes. These include the construction of new irrigation schemes on the "Outer Islands", rehabilitation, and reconstruction as well as upgrading of the existing schemes on the Inner Islands (Java).

In line with the development efforts, it turned up that the massive development and rehabilitation implementation have been significantly constrained by variety of predicaments for pursuing effective operation and maintenance (O&M) under the limited capacity of the farmers to participate supporting the farm level irrigation management. Therefore, the government policy has been adjusted from initially centrally managed toward decentralized O&M approach, giving opportunity for the farming communities (through their water users' association – WUA) to participate in all aspects of irrigation development and management.

This paper presents a series of experiences on participatory irrigation management efforts in Kelara Karalloe (KK) irrigation projects, as the pilot model, in South Sulawesi Province – Indonesia, giving some elaborations on participatory process of

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rehabilitation, upgrading, and repair of the irrigation schemes, as well as post rehabilitation operation and maintenance phases.

Key words: Participatory Irrigation Management, Kelara Karalloe Schemes, South Sulawesi – Indonesia.

I. GENERAL BACKGROUND

In spite of the rapid industrialization of Indonesia over the past 25 years, and the rise in importance of the oil and gas industries, agriculture continues to play a central role in the economy, generating rural employment, earning foreign exchange, and safeguarding basic food security against over dependence on foreign imports. The strategic role played by rural areas in the national economy is evidenced by the fact that about 46% of the total working population (in 2003) has employed by the agriculture, forestry and fisheries sector.

Irrigation, and in particular rice paddy irrigation, plays a strategic role in the ongoing stability and productivity of the agricultural sector. This has been prioritized by the government to be the significant investment on irrigation infrastructure over the last few decades, both in building new schemes and in repairing/upgrading existing schemes. About 61% of the rice grown in the country is irrigated (6.7 million ha), of which over 80% comprises state-run irrigation systems.

However, the quality of maintenance and upkeep of the dams, weirs, canals, and structures has been a cause of concern for decades and continues to be unsatisfactory, characterized by shortages of funds and skilled manpower.

While irrigation technologies are relatively simple, their operation is not, involving hundreds of control structures with gates, thousands of hectares of paddy fields and thousands of farmers who have varying need for water to irrigate varying crops at different stages of growth. This, together with the need to conserve and optimize the use of the available land and water resources, is a continuing challenge for the government and for system operators.

Sizeable increases in crop production are thought to be possible from existing irrigation areas if improved operation and maintenance (O&M) strategies can be devised and implemented in a sustainable manner. Over the last few decades, government priorities have changed from centrally managed and funded O&M organizations to more decentralized systems, with maximum participation by all levels of society. Particular emphasis is directed to farmer beneficiaries who have the most to lose from deteriorating infrastructure and from irrigation system water shortages.

The initial experience prior to rehabilitation of the sizeable Kelara Karalloe (KK) weir irrigation scheme in South Sulawesi may be typical of many of such examples throughout the country, involving steady deterioration during the 1990s, problems resulting from the 1998 crisis and subsequent confusion/opportunities linked to decentralization. A review of the lessons learned during the effort to repair/upgrade the KK irrigation system between 1999 and 2003, and the subsequent success of the level of farmer participation during post-rehabilitation operations, may help in planning and implementing similar rehabilitation exercises elsewhere.

II. THE STUDY AREA (KELARA KARALLOE SCHEME)

2.1. PROJECT LOCATION AND CLIMATIC CHARACTERISTIC

The Kelara Karalloe irrigation scheme is located near the town of Jeneponto on the tip of the south coast of South Sulawesi, some 105 km to the south of the provincial capital, Makassar, in Jeneponto District (*Kabupaten*).

Jeneponto is one of the poorest and driest Districts in South Sulawesi and the name itself means "water bracelet" in the Makassar language, suggesting "water is valued like gold". This area experiences low rainfall (only 1,000 mm to 1,500 mm per year), significantly less than the adjacent Kabupatens of Bantaeng and Takalar, because it lies in a unique rain shortage zone between the southeast and southwest monsoon areas of the two sides of the South Sulawesi peninsular. No doubt due to these tough conditions, the Jeneponto people have developed special cultural characteristics and are recognized as though, independent-minded individuals.

Since agriculture dominates the Jeneponto economy, local prosperity depends very much on the vagaries of the wet and dry season rainfall patterns. Thus, the irrigation scheme built on the Kelara River in the early 1970s (the Karalloe weir was added in 1983) is very pivotal to the local economy.

2.2. IRRIGATION INFRASTRUCTURES

Parts of the KK irrigation area were irrigated by water from an old irrigation scheme constructed before Indonesian Independence. However, the big improvement came with the construction of a weir and intake on the sizeable Kelara River in 1974, together with the long and difficult main link canal (11.4 km including three tunnels) and canals. Water from the nearby Karalloe River was added in 1983. Other additions have been made over the years and the whole scheme now covers 7,004 ha of bounded paddy land, with 13 secondary canals totaling more than 70 km. in length.

Because of the inconsistent rain in the wet season, irrigation is important during both the dry and the wet seasons. However by 1998, due to a variety of reasons, chief of which was deteriorated irrigation infrastructure, the KK irrigated area had declined to less than 1,000 ha (16% of its designed capacity) over the years. There were continuous complaints from farmers, and demands for improvement. The shortage of water led to permanent social discord and the farmers themselves destroyed and damaged the irrigation works in attempts to divert water away from their neighbors' lands, and into their own fields. There were no water sharing plans or staggered plantings, and coordination of irrigation and water management (by government officials) was poor.

A storage dam was proposed as a solution to the water shortages. There is ample water in the two rivers in the wet season, and there are good locations for a storage dam, but construction would be expensive and take some time. It was recognized that the existing irrigation and agricultural land resources were vastly underutilized due mainly to poor water management. Good irrigation and water management was not possible without full commitment, cooperation and participation of the KK farmers and the local community.

Hence a study was undertaken between 1998 and 2000, with the aim to clarify the real causes of the water shortages by collecting and analyzing data and information on the project from both government officials and local farmers, and by making recommendations for improvements. Measures aimed to improve irrigation and water management were implemented between 1999 and 2002 using participatory methodologies promoting farmer participation.

III. THE WATER MANAGEMENT IMPROVEMENTS PROJECT

3.1. THE WATER MANAGEMENT IMPROVEMENT STUDY

The complete water management improvement study (WMI study) originally was designed to be completed in three stages: namely study, implementation of rehab/upgrade works, and implementation of new water resources development. The WMI study was started in July 1998, and completed in three phases by late 1999.

The findings of the WMI Study were:

- The main canal carrying capacity was too small, reduced to 25% of total requirement by defects in the canal, and limited to 50% by the carrying capacity of the tunnels.
- The secondary system was in a poor condition, with heavy sedimentation and siltation, and many broken and leaking canals (some due to "artificial damage").
- The tertiary system was either non-existent or in a poor state of repair.
- Water management was very problematic due to a lack of farmer commitment and involvement, possibly arising from the continuous shortages of water and the special character of the local people.
- Agricultural practices were poor, cropping patterns emphasized limited planting of paddy in the dry season rather than extensive areas of palawija,
- Farmers were not involved in the O&M at all and were belligerent spectators. Water Users Associations (WUAs) existed but were not respected and did not really function.

The average actual cropping intensity for the two years prior to the WMI study (1996 and 1997) was found to be only 126% (Paddy-Paddy and Paddy-Palawija) including a lot of rain fed paddy in the wet season. Yields were around 2.5 t/ha (paddy), 1.0 t/ha (maize) and 0.5 t/ha (green gram). If standard water requirement calculations were used, with main canal capacity only 3 m³/s, it was found that only 923/805 ha (wet/dry seasons) of Paddy-Paddy, or 923/2,044 ha of Paddy-Palawija could be reliably irrigated.

Through an action plan, various options for improving the water availability in the system, including three main alternatives, were considered, namely:

Option 1: Rapid rehabilitation (urgent minimal rehabilitation), to return the system to good condition including reclaiming the main canal capacity to 6 m³/s. Construction works would take 1 to 2 years but the system would be operated throughout, and benefits would be generated gradually, as work progressed. Cropping intensity could be increased to 7,004/2,215 ha (Paddy-Paddy) or 7,004/5,944 ha (Paddy-Palawija).

Option 2: The rapid rehabilitation mentioned above with the addition of main canal reconstruction to increase the capacity to 12 m³/s.

Option 3: The two options mentioned above, plus development of a dam/ reservoir to supply irrigation water for 7,004 ha.

The advantages of the first option that was selected were very clear:

- Almost the whole service area could be planted with palawija in the dry season;
- The cost was relatively low and benefits were substantial and could be realized very quickly; and
- Disruption to water supplies was minimal.

3.2. IMPLEMENTATION OF RAPID REHABILITATION

Work was carried out in eight separate contracts between 1999 and 2003 for:

- Formation and strengthening of farmer groups (by NGO);
- Training of operators and farmers in good O&M practices;
- Provision of O&M equipment;
- Design of rehabilitation of secondary and tertiary system;
- Construction of a water management training center;
- Rehabilitation of the main canal;
- Rehabilitation of the secondary system; and
- Repair and reconstruction of the tertiary system.

In addition, the consultant team undertook water management improvement measures along with improved agricultural techniques through demonstration farms in the KK command area.

3.3. IMPROVEMENTS IN PRODUCTION

The improvements since 1998 have been dramatic with major increases in agricultural production both from (a) increased irrigated areas under cultivation during the wet and the dry seasons and also from (b) increases in yields/ha. The KK scheme area has increased to 7,199 ha.

Furthermore, the enthusiasm of the farmers has improved dramatically, involving full participation in operating the system and contributions to running costs. The farmers in the KK area have become more satisfied with their lot, forward looking and optimistic. Rather than regularly clashing over water, they now cooperate for mutual benefits in the operation and maintenance of the KK irrigation scheme.

The farmers' agricultural skills have improved dramatically. They have been willing to try new agricultural methods and techniques. The SRI (*System of Rice Intensification*) cultivation method has been widely adopted and has moved well past the experimental stage, with the farmers themselves spreading information among themselves. Crop

diversification has also been successful. There is an increasing trend towards dry season cultivation of high yield varieties of maize.

IV. CHRONOLOGY OF OPERATION AND MAINTENANCE OF THE KELARA KARALLOE SCHEME

4.1. THE PERIOD BEFORE 1998

The Kelara Karalloe irrigation scheme was managed by Public Work Services through the Provincial O&M office in Makassar through a standard Irrigation Management Units (*Ranting*)/Sub-unit (*sub-Ranting*) system. There were two Rantings: one for the weir and main canal; and one for the irrigation system below the main off takes.

In spite of relatively generous O&M funding, and a stable O&M staffing structure with several long-serving managers and operators, during this period (up to 1998), the KK scheme steadily deteriorated due mainly to poor management. The Main canal had several leaks and blockages so that its capacity was severely limited even when there was sufficient water in the river. The weir intake gates leaked and malfunctioned, and access to the stretches of the main canal between the tunnels was difficult. The access road had been planted in crops by land hungry farmers. The secondary canals were broken in many places. Gates were broken and malfunctioning. Water was wasted in the upper reaches and never reached the lower/middle reaches. Farmers were perpetually in conflict over water and staff of District offices had endless complaints about the scheme

Even with severe water shortages, there was no attempt to conserve and optimize the water availability through water sharing or rotations. Upstream farmers planted dry season paddy and took whatever water they wanted. There was a traditional annual meeting to decide on KK planting dates and cropping patterns.

Farmers were organized into nominal WUAs, but these were ineffective. Leaders and officials were chosen by local politicians, and by 1998 the WUAs had basically ceased functioning. Under the old regulations, water user fees were to be collected by the WUAs to be used as the government decided, with little connection between payment and level of service. Clearly, with the KK scheme in such a poor state of repair, the local farmers were reluctant to pay irrigation fees, and collection levels were low. Most farmers didn't pay.

4.2. THE PERIOD DURING ECONOMIC CRISIS (1998 TO 2002)

The *Ranting* management system continued after the sudden crisis starting in 1998 that resulted in a severe reduction in funding for O&M and skyrocketing increases in costs of basic foods and essentials. Ironically, management of the KK irrigation scheme during this period saw steady improvements in crop production, with increased dry and wet season plantings and increases in crop yields. This was made possible by the start of the SSIMP3 rehabilitation project, which brought extra funding and expert advisors not available before.

The improvements were also due to the determination of the farmers to grasp the opportunity to improve their own lives. The KK scheme farmers stepped forward to

participate in all aspects of O&M to improve and safeguard their own livelihoods. They enthusiastically joined and participated in WUAs and provided labor for small maintenance works and for control of gates.

4.3. DECENTRALIZATION PERIOD 2002 TO 2005

The Presidential Decree 1999 (Irrigation management policy reform) proposed decentralization of O&M of irrigation systems of all sizes to Districts with a longer term aim to hand over the responsibility for O&M to organized farmer groups and Federations. At the local level, this resulted in a reversion to the former Ranting/Sub-ranting system, but in this case organized and managed by *Bupati* and his staff. As elsewhere in Indonesia, budgets were reduced and many Districts had trouble coping with the new responsibilities, O&M staffs were reduced, and irrigation schemes went into a spiral of decline in performance and productivity.

One disappointing aspect during this period concerned the collection and use of irrigation fees. A local government by law instructed WUAs to collect water user fees and deliver the cash to District government accounts. The District government would then decide (with consultation) when and where it should be spent. Again, farmers did not have confidence that the irrigation fee collections would be used wisely and collection levels were very low. However, with reference to irrigation O&M internal activities within the WUAs themselves and the WUAF, the farmers contributed willingly. There was several maintenance activities carried out by farmers themselves, or through working together local authorities' local government financed work.

4.4. O&M UNDER THE NEW LAW NO.7/2004

The New Water Resources Law enacted in 2004 rationalizes O&M responsibility which is assigned to three administrative levels (Central / Province/District) with the designation of responsibility depending on scheme size (>3,000 ha / 3,000-1,000 ha / <1,000 ha). In addition, WUAs are delegated the responsibility for the construction and O&M of tertiary systems. Under the revised arrangements, the central government will take responsibility for the KK scheme, given its size. The mechanisms and organizations are still evolving, but will certainly involve partnerships, mutually agreed between the different administrative levels for implementation of O&M, depending on the abilities and willingness to participate of each level.

Given the positive experience and clear benefits of good water management practices seen over the past eight years, the provincial and district governments, the WUA Federations, the WUAs and the farmer beneficiaries are all well prepared and ready for whatever the new arrangements will bring, and hopefully the outcome will lead to a further increase in productivity of the KK system.

V. PARTICIPATORY IRRIGATION MANAGEMENT AT THE KELARA KARALLOE

The KK scheme lies wholly within the Jeneponto District (Kabupaten), within 5 Sub-district and 24 Villages. The scheme area covers 7,199 ha, divided into 2,157 tertiary blocks, with 51 WUAs and 11,264 farmers.

5.1. PUBLIC WORKS ORGANIZATION FOR O&M

Under the new regulations, the primary financial responsibility for irrigation O&M of the primary and secondary canals and structures for the KK scheme (>3,000 ha) rests with the central government. The regulations and the organization to accomplish this are still being finalized, but the arrangements in 2006 are:

Funds for O&M are contained in the national funds (APBN) administered by the Project Manager in Makassar. However the system is in transition and some costs are still being covered by Kabupaten funds (APBD). In organizational O&M terms, distinctions are drawn between procedures used for operation, or "O", and maintenance, or "M".

The current organization for operating the KK scheme is still the old organizational framework derived from the decentralization era, involving 34 staff, all of whom employees of Kabupaten Jeneponto, covering two Irrigation Management Units (*Ranting*) and seven Sub *Ranting*. There is 34 staff at the scheme, comprising four civil servants (*Ranting* heads and staff) and 30 gate operators. The salaries of the civil servants are still paid from APBD, but those of the gatekeepers are paid from APBN mentioned above. However management and control of operation of the KK scheme is completely handled by the Kabupaten management team. All other operating costs (office, transport, communication) are still borne by the Kabupaten through APBD.

5.2. THE USE OF INTERMEDIARIES AS FACILITATORS

A very critical component of the program to promote active involvement by local farmers and leaders in the development of the WUAs and WUAFs, and in improvements in irrigation management and agricultural skills, was the sustained use of intermediaries as facilitators of capacity building elements. These intermediaries comprised locally-based NGOs with previous experience in participatory irrigation management in other SSIMP schemes during earlier phases, who were supervised by selected Consultant staff.

The NGO intermediaries (or facilitators) worked closely with local government agency personnel and remained involved with activities in the KK scheme on a sustained basis, rather than short-term inputs. They thereby developed local expertise and effective relationships with local farmers and WUA/WUAF leaders. The local entities had confidence in the intentions and skills of the intermediaries and in their acquired practical local knowledge.

5.3. FARMERS' ORGANIZATION

The basis of participation by the farmers in the KK scheme is through their WUAs and WUAFs. The KK scheme area (7,004 ha) is divided into 3 WUAFs with 51 WUAs and a total of 11,264 farmers as follows:

WUAF Abadi: This federation covers the eastern part of the scheme area, comprising 3,241 ha in 46 tertiary blocks, with 25 WUAs and 5,072 farmers

WUAF Abulosibatang: This federation covers the central part of the area, comprising 446 ha in 24 tertiary units, with 10 WUAs and 2,710 farmers.

WUAF Turbin: This federation covers the western part of the scheme area, comprising 2,157 ha in 40 tertiary blocks, with 14 WUAs and 3,081 farmers.

The remaining area (355 ha) lies in small parcels along the Kelara Main Canal, each served by separate off-takes and with 2 WUAs, 15 tertiary blocks and 401 farmers. The Supreme or apex (induk) WUAF is still in embryo form and has not yet been finalized. In the interim, the PU managers continue to coordinate with each Federation leader on O&M matters.

5.4. PARTICIPATION BY FARMERS IN O&M OF THE KK SCHEME

The most significant part the WUAFs play in O&M at the KK scheme is in water scheduling and distribution.

- When irrigation water availability is adequate, or between 4 and 6 m³/s, the three WUAFs divide irrigation supplies at the major diversion structure in proportion to their areas and then guard those settings.
- When the available water falls below 4 m³/s, the WUAFs switch to irrigation rotational procedures, involving a 2.5 - 2 - 2.5 days allocation for each of the three WUAFs. Within each WUAF sub-command, schedules have been developed for sharing water between day blocks and night blocks. Each block is split again into roughly 1/3rd of their areas, with each sub-area getting an allocation for the 1st, 2nd or the 3rd day.

The WUA Federation leaders propose the schedules and the gate operators carry out their instructions for the setting of the gates.

This kind of water scheduling needs a high degree of cooperation among water users. It is unlikely that government operators could achieve satisfactory performance levels at the KK scheme without the involvement of the WUAs/WUAFs. The federation leaders ensure that their members obey the scheduling rules and have developed sanctions for persistent offenders.

As can be seen from the description of the organization for O&M described above, it is still in process of adapting to the new national policies. Farmers continue to participate in irrigation O&M activities in several ways:

- Farmers are mobilized on a voluntary group basis under traditional practices (*Gotong Royong*) two times every year just before the start of the planting to undertake light maintenance work in the secondary canals, such as clearing sediment, grass cutting, small lining repairs.
- The farmers themselves decide on cropping patterns and water distribution schedules, and the Bupati issues appropriate instructions based on these group decisions. The WUAs and WUAFs have agreed on sanctions to be imposed on farmers who do not follow the agreed crop and water schedules and then waste valuable water.
- In previous years farmers collected funds informally for use in O&M where they saw a need. In 2005 they lobbied successfully to change the by-law about water user fees going to Kabupaten accounts. Under revised procedures, the WUAFs

can now keep the funds for their own internal WUAF use. Starting in 2006, they will strictly enforce payment by members at a level of Rp.25,000/season/ha, and 20% of members have so far paid these amounts.

- The farmers themselves have greatly expanded the area cultivated in *palawija* crops during the dry season so that more area can be planted. In 2005 this *palawija* area had increased to 2,500 ha, with only 1,500 ha of paddy.
- In 2003 the Karalloe weir sluice gate stem seized up and could not be closed. The government at that time had no funds for repair so the farmers paid for the repair themselves.
- At the end of 2005 there was a serious landslide into the main canal, completely cutting off irrigation flows at a critical time before wet season plantings. The irrigation maintenance funds through APBN had been allocated elsewhere and there was no money available for this work. At the initiative of the WUAF leaders, repair work was initiated by requesting Kabupaten assistance with heavy equipment, and the WUAs themselves arranged to provide the necessary labor to clear the blockage.

V. LESSONS LEARNED AT KELARA KARALLOE

(1) Rehabilitation of an operating irrigation project needs full participation by the beneficiaries and a multi-disciplinary approach involving farmer group strengthening, improved agricultural practices, training in O&M and repairs to the infrastructure. Placing too much emphasis on construction works at the expense of these preceding activities can lead to disappointing results.

(2) The whole-hearted support of local government is an essential prerequisite for successful participation. In Jeneponto District, the Bupati gave his full attention and support to the improvement measures proposed for the KK scheme.

(3) The appropriate emphasis for improvement works should be on improved water management and increased crop production. An overall water management study, carried out before improvement works start, is highly useful and effective in producing a successful strategy. Full consultation is needed with all stakeholders focused on finding the real problems and proposing real solutions.

(4) The promise of funds for rehabilitation can be a great incentive for farmers to change negative perceptions and to increase participation in necessary irrigation O&M activities.

(5) Participation must be meaningful and involve empowerment of farmers. Previous attempts to use WUAs as government tax collectors failed because the benefits of participation were one sided.

(6) Participation can be improved by the sustained use of neutral groups as who can be trusted by farmers (consultants or NGOs) as intermediaries and facilitators, as was done in the case of the KK scheme improvements.

(7) The participation model must be suitable for local conditions, not a standard and uniform system imposed from above. For example, in the KK scheme, the sizes of the

WUAF areas are not equal, the main canal was left out of the water scheduling, and efforts were made to ensure that the traditional local leaders were involved from an early stage, thereby co-opting potential opposition.

(8) Designing WUAF sub-commands of unequal sizes areas is not necessarily a problem. It is much more important that the Federations are granted total control of the water in their areas

(9) A step-by-step approach to initiating irrigation physical, organizational and management improvements is recommended. At the KK scheme, the rehabilitation was carried out in several separate stages, with the early stages generating significant benefits for all, which in turn led to a greater willingness to participate and cooperate in future activities and stages.

(10) Continued support and training after physical works are completed generate positive additional impacts on active participatory water management and outcomes.

(11) Study tours conducted outside of the geographical scheme area, including alternative cultural settings, proved to be highly effective in demonstrating modern O&M practices. At Kelara Karalloe, the farmers were taken to East Java irrigation schemes where the WUAF leaders had a high level of positive involvement in O&M matters.

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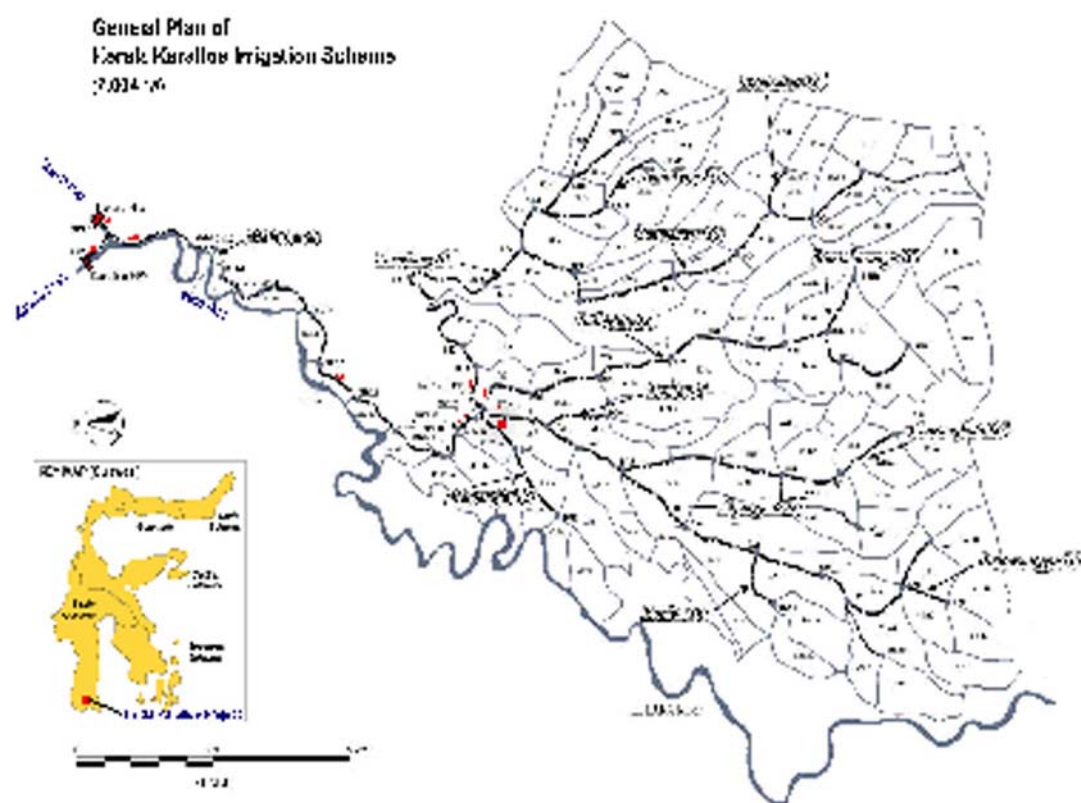


Figure O&M Organization for Kelara Karalloe Weir Irrigation Scheme in Jeneponto District

