



SURVEY REPORT 2:
STAKEHOLDER MAPPING
Main Reports: Key Findings

Tertiary Irrigation Technical Assistance

February 2016

TABLE OF CONTENTS

| | |
|--|----|
| LIST OF TABLES | II |
| LIST OF FIGURES | II |
| LIST OF APPENDICES..... | II |
| Abstract..... | 1 |
| Executive Summary | 1 |
| 1. Introduction | 1 |
| 2. Stakeholder Map and Categories | 2 |
| 3. Analysis: Stakeholder Matrix | 5 |
| 3.1 Key Stakeholders | 5 |
| 3.2 Supporting Stakeholders | 6 |
| 3.3 Policy Level Stakeholder..... | 7 |
| 3.4 Women's Roles | 8 |
| 3.5 People With Disabilities..... | 10 |
| 4. Envisaged Selection Process..... | 12 |
| 4.1 District Level: Program Introduction and Consultations | 12 |
| 4.2 Village level: TIRTA's offer and prioritisation/selection | 12 |
| 5. Preliminary Selection Criteria..... | 13 |
| 6. Attention to gender and social inclusion..... | 14 |
| 7. Managing relations to Government | 15 |
| 7.1 National Level | 15 |
| 7.2 Provincial Level | 15 |
| 7.3 District Level | 15 |
| 8. Assessing Impact..... | 17 |
| 8.1 Defining smallholder farmer income..... | 17 |
| 8.2 Program impact assessment: primary and secondary beneficiaries..... | 17 |

LIST OF TABLES

| | |
|---|----|
| Table 1: Overview of stakeholder-types and numbers of interviews | 1 |
| Table 2 - Comparison of Daily Working Hours for male and female farmers | 9 |
| Table 3: People with Disabilities in 9 sampled villages | 11 |
| Table 4: Preliminary Selection Criteria for Participation in a TIRTA Intervention | 13 |
| Table 5: Different Levels of Government Involvement | 15 |

LIST OF FIGURES

| | |
|---|---|
| Figure 1: Stakeholders in the paddy production process..... | 3 |
| Figure 2: Stakeholder Map for Pump-lift Irrigation Services along the Lower Bengawan Solo | 4 |
| Figure 3 - Paddy Cultivation Stages and Division of Labour between Men and Women..... | 8 |

LIST OF APPENDICES

| | |
|--|----|
| Appendix 1: Stakeholder Matrix - Irrigation Services..... | 18 |
| Appendix 2: Farmers: production and income..... | 24 |
| Appendix 3: Interviewed entrepreneur/investors | 26 |
| Appendix 4: Service providers: asset value and income | 27 |
| Appendix 5: Gender and Social Inclusion – The March/April 2015 Survey | 28 |
| Appendix 6: Kabupaten Bojonegoro – Numbers of disabled residents, 2014 | 29 |
| Appendix 7: Working with a disability: Bapak Sucipto | 29 |
| Appendix 8: Detailed activities in the selection process | 30 |

ABSTRACT

At the center of the Stakeholder Mapping is the identification of the key actors (key stakeholders) in the pump-lift irrigation services market along the Lower Bengawan Solo, their interests, capacity, incentive challenges, and perceptions. Key actors are the farmers and the service providers. This understanding of the stakeholders provides a basis for developing a strategy for the project, including the formulation of selection criteria for interventions.

EXECUTIVE SUMMARY

TIRTA aims to improve the incomes of 10,000 small-holder farmers, by at least 60% by 2018. The programme is designed to achieve this in accordance with the M4P approach: namely by addressing the underlying constraints to the private-sector expansion of irrigation services. This can be effectively achieved if 3,500 ha of non-irrigated land is brought under irrigation. To this end, TIRTA will operate in three provinces: East Java, West Nusa Tenggara and East Nusa Tenggara, focusing on pump-lift irrigation in three districts of the Lower Bengawan Solo in East Java.

TIRTA conducted a two-staged survey to enable the team to develop a thorough understanding of the current pump-lift irrigation service market. Stage 1 identified potential sites for irrigation services expansion; Stage 2, identified and assessed the actors and stakeholders in the market. Together, these reports inform the identification of entry points, and the design of TIRTA's opening portfolio of interventions. This is the Stage 2 Report.

Stakeholders

Existing pump-lift irrigation services support paddy production. Paddy producing farmers make use of a range of other services, such as farm labour, retail of agriculture inputs, land for rent, and sell their produce to paddy millers and traders; all of them would benefit from increased paddy production. The survey zoomed in on the irrigation services market proper and identified three categories of stakeholders. **Key stakeholders** on the demand side are the **farmers** and on the supply side the **irrigation service providers**, either 'entrepreneur/investors' or 'community organisations' (HIPPA, Kelompok Tani, and BUMDes). **Supporting stakeholders** are financial services, fuel retailers, pump sellers and repair centers. **Policy stakeholders** at the various levels of administration issue and apply regulations affecting the business environment for the pump-lift irrigation market.

Farmers cultivate land which they own or rent – for most this is in the order of 0.3-0.4 hectares. For nearly all, income is under USD2.5 per capita per day. Farmers with access to irrigation are considerably better off than those without. Rain-dependent land produces only one paddy harvest per year with a net value of Rp 23 Million, followed in some cases by a palawija crop; irrigated land produces at least two paddy harvests with a net value in the order of Rp 30 Million per crop. Indeed, lower incomes - 'under 100% of the national cut off poverty line' - were seen more frequent among those without access to irrigation services than among those with access.

Entrepreneur/investors are at the forefront of the pump-lift irrigation services market. In villages which have never had access to irrigation before, successfully bringing land under irrigation depends primarily on them. There are three categories: small- (5-10 ha), medium- (up to 200 ha), and large-scale (>200 ha) entrepreneurs. Members of the last one are the most able ones and most interested in opportunities to expand their service area.

Community organisations vary in capacity and for the weaker ones, any interventions for activating them are unlikely to be successful. For these, the way forward would be to facilitate the community to establish a collaboration with an entrepreneur, with a view of later transitioning to a fully community-managed irrigation service.

Perhaps the most powerful policy stakeholders for TIRTA are (i) the Balai Besar Wilayah Sungai Bengawan Solo (BBWS) and (ii) the Bupati. The team should consult the BBWS with regard to accommodation of the increased water demand associated with an expansion of the irrigation services. The Bupati would be the one to champion the expansion of services and mobilizing his support would create a favorable environment.

For inviting applications for participation in a TIRTA intervention, the team will make an offer of assistance and facilitation to stakeholders who express interest in expansion of irrigation services. Stakeholders will submit proposals and go through a selection process for identifying the ones with best potential. Selection criteria include technical feasibility, mainly determined by physical aspects, such as area size, topography, and ease of access to the water source; cost of the intervention relative to the outreach; number of benefiting farmers; commitment to the expansion initiative; availability and capacity of a service provider; and potential for conflicts.

The survey revealed that women have crucial roles in farming, but that these cannot be found back in the statistics. Farming households cultivating rain-dependent land are limited to producing one paddy crop annually and depend to a large extend on off-farm work for generating enough income. When their land gets access to irrigation services they can plant 2 - 3 paddy crops. This will increase the household's income and work load. It will also create new

TIRTA – Survey stage 2 – Results and Initial Analysis

opportunities for households providing farm labour. The team will establish a monitoring system that can capture information on women roles in farming and on families with members living with disabilities. The team will pay special attention to getting women headed farmer households and families with disabled members participate and benefit and receive the improved irrigation services.

TIRTA's impact goal defines the primary beneficiaries as farmers/small-holders. In addition to assessing the impact on them, the team could attempt to also assess the impact on the secondary beneficiaries, being the small enterprises, situated in and around the target villages, directly supporting the paddy cultivation process and the irrigation services. Particularly the irrigation service providers will enjoy increased incomes due to the expansion and will become more viable enterprises and sustain their irrigation services.

1. INTRODUCTION

Upon completion (December 2018), TIRTA is expected to have improved the incomes of 10,000 small-holder farmers, by at least 60%. TIRTA is designed to achieve this in accordance with the M4P approach, namely by developing incentives for private sector initiatives to expand irrigation services. Assuming an average land holding per farmer of 0.35 ha, the above target would be achieved if 3,500 ha of non-irrigated land was brought under irrigation. TIRTA will operate in three provinces: East Java, West Nusa Tenggara and East Nusa Tenggara. In its first 18 months, TIRTA's operational focus will be on the expansion of pump-lift irrigation services along the Lower Bengawan Solo in three of East Java Province's Districts: Bojonegoro, Tuban, and Lamongan.

The Managing Contractor's team for TIRTA commenced its work on 22 July 2015, setting out to develop over the first six months a thorough understanding of the current pump-lift irrigation services market in the above focus area, through a two staged survey. The first stage focuses on identifying the sites that have the most potential for expanding irrigation services. The second, is an assessment of stakeholders in irrigation services expansion.

Stage 1 was completed from September to October 2015 and inventorised (i) all existing pump-lift irrigation services, recording the location of pump stations, the coverage, and the governance/management arrangement, and (ii) any perceived potential for expansion of pump-lift irrigation services. The pump stations were photographed and their GPS-recorded locations were plotted on an internet-based map. The map and photos can be visited via the following links:

Map : <https://www.google.com/maps/d/u/0/edit?mid=zEHQUP2Muvec.kzh90Zl17uvc>

Photo's : <http://www.panoramio.com/user/8843658>

This report covers **Stage 2**, the stakeholder mapping, the purpose of which is to identify and clarify the interest, incentives, capabilities, constraints and perceptions of future irrigation opportunities of relevant stakeholders in the pump-lift irrigation market. For this purpose, the survey interviewed 186 stakeholders, as listed in table below. A detailed technical report is in Annex.

The survey helped the TIRTA team to gain a good understanding of the pump-lift irrigation services market and its actors along the Lower Bengawan Solo with regard to who they are, what roles they play, and what interests drive them to take part in the market. The analysis is presented in Sections 2 and 3. The thus gained understanding has helped the team to identify a number of strategic elements to guide the planning and design of interventions, which are discussed in the Sections 4 to 8.

Table 1: Overview of stakeholder-types and numbers of interviews

| No | Stakeholder-type | No of respondents |
|--------------|---|-------------------|
| 1 | Village (Farmers, Entrepreneurs, HIPPA/ BUMDES, and supporting retailers) | 108 |
| 2 | Pump Suppliers and Repair Shops | 14 |
| 3 | Investors (additional) | 6 |
| 4 | People and Family with Disabilities | 32 |
| 5 | Financial Institutions | 5 |
| 6 | Government Agencies | 21 |
| Total | | 186 |

2. STAKEHOLDER MAP AND CATEGORIES

The wider environment of the pump-lift irrigation services market is the paddy production process, as shown in Figure 1. It shows that farmers make use of a range of service providers, such as farm labour, retailers of agriculture inputs, land owners who rent out their land, and irrigation services providers. The produce is then sold to paddy millers and traders. At different scales, these stakeholders would all benefit from an increased paddy production.

The map of the irrigation service market is shown in Figure 2. Stakeholders/actors can be divided into three categories: **Key Stakeholders**, **Supporting Stakeholders**, and **Policy-level Stakeholders**.

The **key stakeholder** category consists of two sub-groups, namely **farmers** as the customers of irrigation services, and **service providers**. Service providers can be 'entrepreneurs/investors' or 'community organisations', such as HIPPA, Kelompok Tani, and BUMDES. The service providers employ staff, including water operators and mechanics for the daily operations of businesses.

To be able to provide their service, providers rely on a range of support services, including financial services, retailers supplying fuel, and technical services, such as pump sellers, pump repair shops, and the state-owned companies PLN and Pertamina. In the map, these stakeholders are categorized as the **supporting stakeholders**. The survey found that irrigation service providers make use of financing services from several institutions, such as BRI, Bank Jatim, Bank Perkreditan Rakyat (BPR), and Program PNPM/Unit Pelaksana Kecamatan. The financing goes towards the investment, namely the setting up of the pump station and canal system (multi-year investment capital) and/or for the seasons cost of operation of the pumps (seasonal work capital).

The **policy stakeholders** play important roles in the enabling environment for the pump-lift irrigation market. They are responsible for issuing and implementing various regulations, at the various levels of administration including, village, subdistrict, district, provincial, and river basin level.

At the village level, the village head (kepala desa) and the village's informal leaders (who may sit on the village council (Badan Pemusyawaratan Desa) have the responsibility to facilitate the empowerment and the development of the people in the village. Ensuring that the villagers have access to water to support their paddy cultivation is part of their role.

At sub-district level, the Camat is the head. He coordinates and supervises the developments in the villages under his jurisdiction, including inter-village coordination. He reports directly to the Bupati, making him the lynchpin between the District Technical Agencies and the villages.

At the district level, the Bupati heads the administration and formulates the district's development policy. For example, in Bojonegoro District, increasing paddy production is a key development policy. He has several technical agencies, among which a number are relevant for TIRTA. **Bappeda** is the coordinating body for planning, budgeting, and performance monitoring. Others are **PU Pengairan**, **Pertanian**, and **BPMPD (Community Empowerment and Village Government Bureau)**. At the river basin level, Balai Besar Wilayah Sungai (BBWS) Bengawan Solo is responsible for the management of the water resources of the Bengawan Solo basin which covers 20 districts and three cities in East and Central Java Province.

Figure 1: Stakeholders in the paddy production process

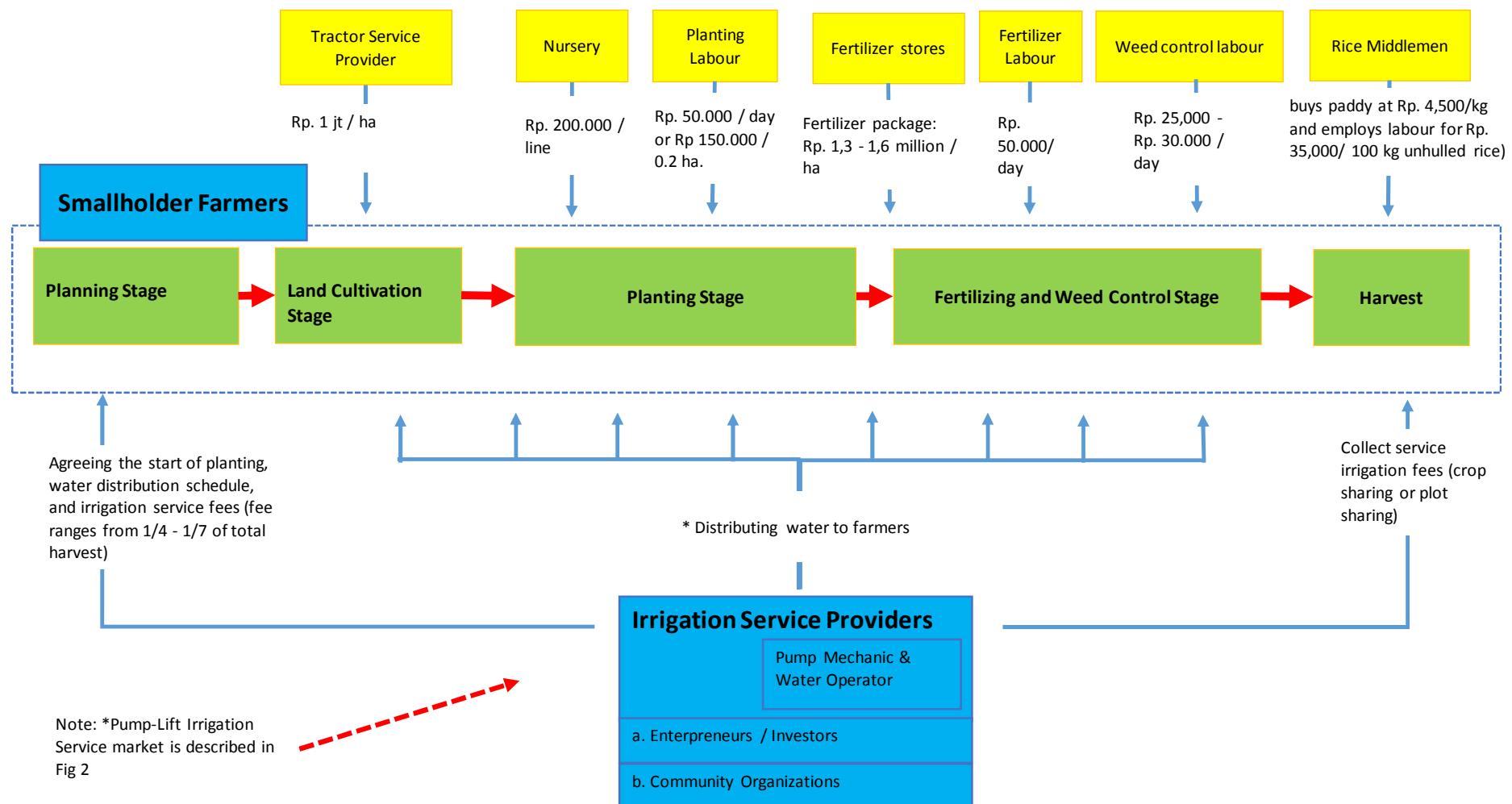
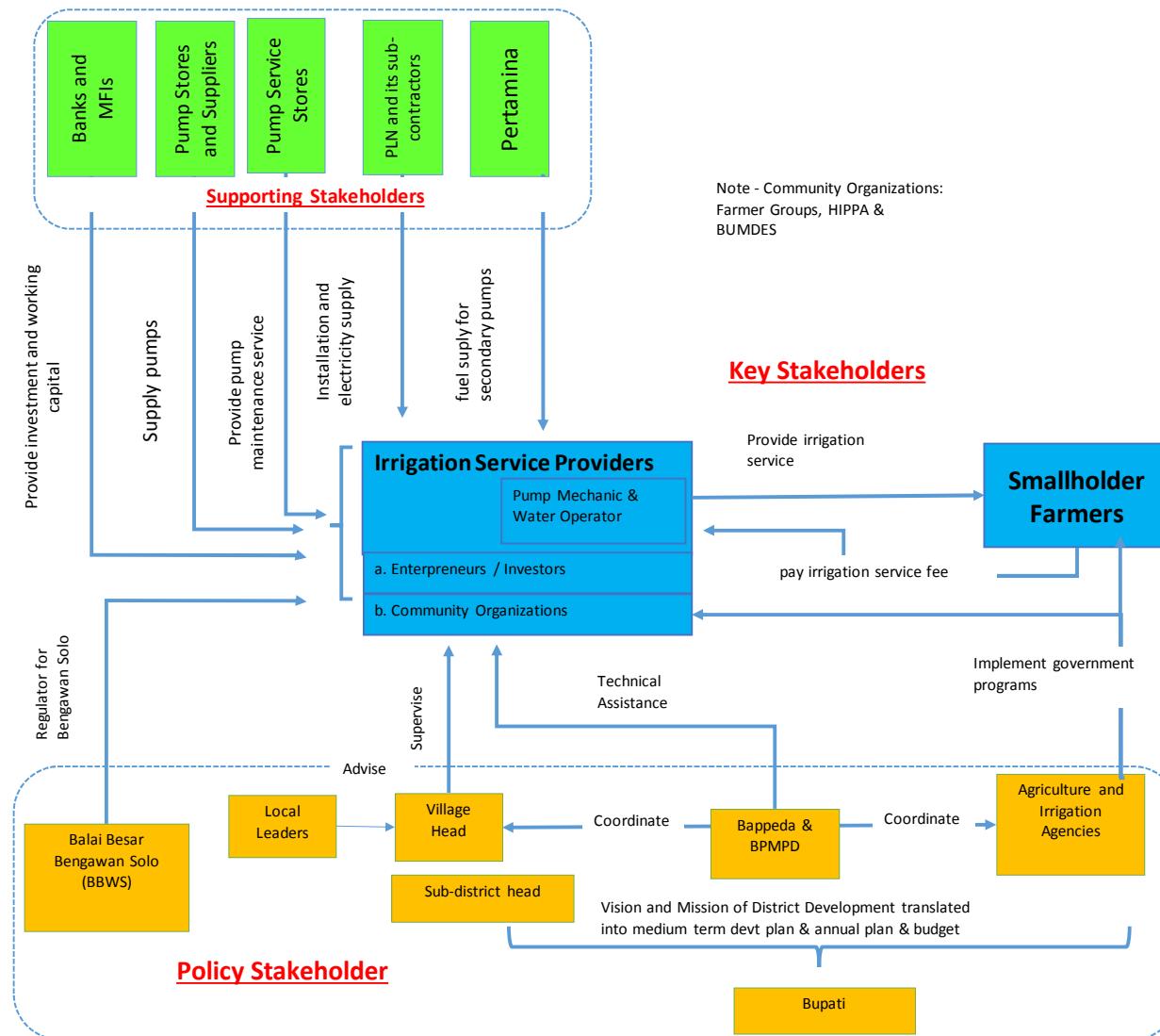


Figure 2: Stakeholder Map for Pump-lift Irrigation Services along the Lower Bengawan Solo



3. ANALYSIS: STAKEHOLDER MATRIX

This section summarises the stakeholder analysis in terms of roles, interest, resources & capacity, and expected position towards TIRTA. See Appendix 1 for the complete Stakeholder Matrix.

3.1 KEY STAKEHOLDERS

In general, there is an equally high interest among key stakeholders, including farmers and service providers (entrepreneurs/investors and community organisations) in expanding irrigation services in order to make additional planting seasons per year possible.

Farmers: The TIRTA team defines ‘farmers’ as individuals or households who cultivate land that they own or rent. The land a farmer works is for the majority of them at average about 0.3-0.4 hectares only. Most farm household incomes fall in the category of ‘under 150% of the national cut off poverty line’, meaning that they sustain their living with under USD2.5 per capita per day. The survey found that the percentage of farmers with an income ‘under 100% of the national cut off poverty line’ is much higher among those without access to irrigation services (generally having their land situated further from the river bank): 7 out of 15 (41%), than among those with access (generally having their land close to the river bank): 5 out of 35 (15%), which constitutes a clear driver for the expansion of irrigation services.

There is a relatively high proportion of farmers who have entered senior age but are still undertaking productive activity. Of the 52 farmers that the team interviewed 67% are between the age of 45 – 75 years old and, of whom, about 27% are already above 60 years old. Most farming families (73%) have four members.

Despite their major role in paddy production, women’s roles are not sufficiently recognized. The reported roles that women play in paddy production are during the cultivation of the land, planting and making decision for selling the paddy. They also contribute to household incomes by working on other farms as paid labour.

The survey also found that there is a substantial number of farming families with members living with disabilities. These two aspects women’s role and people with disabilities are discussed in more detailed in Sections 3.4 and 3.5.

In contrast to farmers with irrigation service who are able to have two or three harvests per year, rain-dependent farmers can only have one harvest per year. However, they reported that they may have a chance for a second harvest of a non-paddy crop such as corn, chilly, or tobacco, if late rains support this.

The average paddy production is about 4.5 tons/ha¹. Rain-dependent land produces only one paddy harvest per year with a net value of Rp 23 Million/ha, followed in some cases by a palawija crop (see Appendix 2). Irrigated land produces at least two paddy harvests with a net value in the order of Rp 30 Million/ha per paddy crop.

Farmers who have access to pump-lift irrigation pay the irrigation service by sharing a proportion of the harvest at the end of the season. The farmers pay the irrigation service at a range of 1/7th to 1/3rd of the total harvest depending on the service provider type². The total cost for irrigation constitutes about 40-60% of the total crop production cost. In a rice production system, farmers do not only rely on irrigation service providers, they also require services available within and around the villages such tractor providers, seedling sellers, and farm labour.

Considering the large role that all kinds of services play in the paddy production process, a substantially increased paddy production would not pose a capacity challenge for the farmers themselves. However, where farmers have no previous experience with irrigated paddy cultivation, they will not immediately be able to reach a top-level production. Interviewed entrepreneurs/investors reported this as a problem, prohibiting them from investing since their profit depends on the actual yield level farmers achieve, unless assisted in enhancing their capacity.

Service providers: Service providers were found to vary substantially in capacity and scope. There are two principal types of service provider: entrepreneurs/investors, with inherently clear profit goals, and community organisations operating on a not-for-profit basis: HIPPA, Kelompok Tani, and BUMDES.

¹ 95% CI ±1.75.

² HIPPA & BUMDES charge 14-16%, Entrepreneurs taking water from Bengawan Solo charge 20%-25%, and Ground Water Entrepreneurs charge 33% of the harvest.

Entrepreneur/investors are at the forefront of the expanding pump-lift irrigation services market. Successfully bringing land under irrigation in villages having never had access to irrigation before depends primarily on them. The last group is the most enthusiastic one with regard to increased opportunities for expanding their service area. During interviews they indicated that they regard TIRTA as a potential partner in identifying potential for services expansion.

Survey stage 1 had found that in Bojonegoro by far most service providers are entrepreneurs/investors. In Tuban and Lamongan they are rare nowadays. The survey interviewed ten entrepreneurs/investors (for details see Appendix 3, and individual profiles in Annex). The analysis grouped them into three categories: small-scale entrepreneurs, serving areas of 5-10 ha only, medium-scale entrepreneurs, serving up to 200 ha, and large entrepreneurs serving areas exceeding 200 ha, selected from each a representative case and looked at the value of their assets and the income they obtained from their service during the second dry-season paddy crop (2015). Asset values per hectare of served area vary narrowly between Rp 5 million to Rp 6.5 million. Costs of operation vary widely, though, from 1.3 to 4.2, with Hadi Pranoto (7 ha) having the lowest cost and Muslih (75 ha) the highest. Gross revenue is in a narrow range of 5.4-6.1 per ha, with Sudarwaji's (426 ha) Rp 2.7 million/ha being an exception. Inherently, net income among these entrepreneur/investors varies widely, namely from Sudarwaji's low of 0.5 to Hadi Pranoto's high Rp 4.1 Million per hectare. In between are Muslih with 1.9 and Haji Makmur (360 ha) with Rp 1.6 million/ha, and thus a seasonal income of Rp 586 million (AUD 62,000). Sudarwaji's revenue per ha being 50% lower than what the others collect suggests that there might be an inefficiency in his process. Hadi Pranoto's very high net income per hectare, bringing him a welcome seasonal income of Rp 29 million (AUD 3,085), is due to his surprisingly low cost of operation, which might be related to the small scale of his operation which makes a highly efficient water distribution possible.

In two out of seven sampled villages with irrigation services, a community organisation (in both cases a BUMDes) provides the service. In the other five, an entrepreneur/investor, and in only 2 of these 5 a HIPPA exists. A BUMDes ('Badan Usaha Milik Desa') is a desa-owned enterprise undertaking business activities that will improve the standard of living of the desa residents. The concept was developed recently and is promoted by Bappeda. The strong point of BUMDes is that it is set up as an enterprise, has an associated legal basis, and can access financing from banks. Conversely, HIPPA are 'associations' of water users, serving the interests of their members. For them it is very difficult to access loans. In Bojonegoro, a number of BUMDes exist and these receive capacity building from Bappeda. Where a desa had/has irrigation services provided by its community organisation they typically become merged into the BUMDes-business. The covered two BUMDes, namely of Desa Kedungprimpen and of Desa Gedongarum, both in Bojonegoro, have impressive plans for expansion of irrigation services across the border of their desa. BUMDes Gedongarum (505 ha) estimates the value of its assets at Rp 2.2 million/ha and reports a cost of operation of only Rp 2.4 million/ha, which is relatively not high if compared with the cost of operation of some of the entrepreneur/investors (see above). With gross revue at Rp 5.6 million/ha, its net income is relatively high: Rp 3.2 million/ha, resulting in a seasonal income of Rp 1,632 million (AUD 174,000). However, the BUMDes admitted to have very little savings as the profit is paid to those who provided capital or guarantees (assets) for loans.

TIRTA understands that activating community organisations through training is unlikely to be successful. Instead, TIRTA's strategy would be to facilitate the community to establish a collaboration with an entrepreneur, with a view of later transitioning to a fully community-managed irrigation service.

Risk: Having no access to pump-lift irrigation services from the Bengawan Solo, farmers living further away from the river currently make use of groundwater irrigation services. These services are considerably more expensive, with standard service fees being 1/3rd of the harvest. In areas where there is potential to expand pump-lift irrigation services, friction between the entrepreneurs of these two types of services are likely to emerge. This would need to be addressed at the initial stage of an intervention facilitating an expansion.

3.2 SUPPORTING STAKEHOLDERS

Within this group of stakeholders, there are two 'levels' which can be distinguished as playing equally important roles. At the first level, closest to the irrigation services market, are pump suppliers, repair shops, financing institutions, etc., as per Figure 2. At the second level, are those who relate to the paddy production process, such as farm labour, retailers of agriculture inputs, land owners who rent out their land, and irrigation service providers.

The supporting stakeholders for the irrigation market are anticipated to have the capacity to cope with an increased demand for their services due to an expansion of irrigation services as facilitated by TIRTA. For the stakeholders at level 2 – essential for the farmers to achieve top paddy production – it would be wise to make sure they are aware of the possible increase in demand for their services.

3.3 POLICY LEVEL STAKEHOLDER

TIRTA will have to engage with different levels of policy related stakeholders for different purposes. At the district level, the first entry will be through District Bappeda. Obtaining the support from Bappeda (Bureau for planning and budgeting) is non-negotiable. Bappeda plays a crucial role in district planning and budgeting and has the authority to coordinate technical agencies such as PU Pengairan, Pertanian and Village Development and Administration Bureau (BPMPD). Coordination with Bappeda should be undertaken in order to share information about TIRTA and for TIRTA to understand and align with district government priorities in irrigation. TIRTA can capitalize on Bappeda's role when there is a need for multi-agency coordination during the implementation of TIRTA's interventions.

Other than Bappeda, the remaining district agencies are the technical agencies such as PU Pengairan, Dinas Pertanian and BPMPD. The interaction with technical agencies will occur at two levels; agency level and field level. At district level, PU Pengairan will play a significant role in the provision of facilities and infrastructure for irrigation as well as the strengthening of HIPPA capacity. Dinas Pertanian is responsible for providing irrigation facilities and infrastructure to support agriculture sector. TIRTA can collaborate with these two agencies, seeking strategic alignment with some of the programs they are currently implementing such as pump distribution and harvest failure insurance program.

All the relevant government agencies have their field staff present at the village or kecamatan level. Bappeda has its contracted staff at the village working to improve the capacity of the village business unit. PU Pengairan has "*mantri pengairan*" and Dinas Pertanian is also present with its extension staff (*Petugas Penyuluhan Lapangan*). These staff can be involved during the preparation of village proposals or during the capacity building process for the farmers and their organisations.

In addition to the above district and field level coordination, at the regional level, the role of Balai Besar Bengawan Solo as the regulator of Bengawan Solo should not be sidelined. TIRTA's project will directly impact the demand of water from Bengawan Solo. Continued communication with the Badan should be maintained especially during the intervention design process. Information regarding the projected need of water supply for the newly covered areas needs to be conveyed to BBWS to mitigate any possible resistance from this agency towards the expansion plan and to ensure that TIRTA operates within the existing regulatory framework.

At the village level, Kepala desa is the entry point before any discussion with the farmers and the community organisations can be held. Plans for expanding irrigation services will not be successful without support from the Kepala Desa. His capacity in community organising and as the budget holder for village funds are two qualities that TIRTA can capitalise on for the expansion of irrigation service in the villages. There are some caveats that the TIRTA team should be aware of, particularly if the village heads are also active as irrigation service providers. They may not necessarily support TIRTA's existing strategy to have irrigation services fully managed by community organisations (HIPPA/BUMDES). Other than Kepala Desa, the subdistrict head, *Camat*, also plays an equally crucial part particularly for the irrigation service across village boundaries. Camat is the point of coordination among villages. Although village heads do not report to subdistrict heads, the Camat represents the Bupati as a coordinator and therefore garners respect from the village heads and therefore can facilitate negotiation among the villages and can help link the villages with district technical agencies.

3.4 WOMEN'S ROLES

Prior to the start of TIRTA, in March-April 2015, a Gender Assessment was conducted, surveying the envisaged operation area along the Lower Bengawan Solo.³ The report discusses gender and social inclusion aspects, making a number of points, which we have summarised in Appendix 5.

Considering the report's conclusions and recommendations, the TIRTA Team survey's stage 2 decided to verify some of the points for improving direct insight. The survey collected information related to the distribution of roles and responsibilities between men and women in the paddy cultivation process and women's role in village water-user organisations. This information will be significant during the intervention design to ensure an equitable distribution of program impact on men and women. The survey interviewed 58 farmers (7 females) and representatives of eight irrigation service providers (HIPPA/BUMDES) out of 19 sampled villages in Bojonegoro and Tuban. Although the scope of data collection was not as extensive as the Gender Assessment, the team came across some similar findings.

The interviews revealed that women play significant roles at several stages of the paddy cultivation process, such as during the preparation of the land, weeding, planting, and decision-making on the sale of the harvest. Typically, women in farming households not only do the daily house chores but also work on the family land as unpaid labour. A number among them works in addition as paid farm labour on other farm land, commonly within their own village. Their pay ranges from Rp. 30,000 – Rp. 40,000 per day (in contrast to DFAT's Gender Team's findings, the survey did not find any case of different pay levels for male and female workers).

TIRTA will facilitate expansion of irrigation services, turning rain-dependent land into irrigated land. Where farmers were used to grow just one paddy crop per year, they will then grow two paddy crops, or even three per year. This change will have an impact on the farming households' income and labour burden, possibly varying between man and women. As a result of the doubling (or tripling) of area under paddy cultivation, incomes of paddy producers will increase and welcome new opportunities for those who provide farm labor will emerge. The team wanted to check in the first place for possible adverse impacts on women.

A possible negative impact would emerge if as a consequence of the stronger demand for farm labor, (young) women are held back from exploring education and non-farm employment opportunities (e.g. a job in the city or at a factory) that could offer them a better (future) pay (*opportunity cost*). Where they already have such jobs, they may be pressed to stay home instead for helping on the farm (*trade-offs*). We would expect that for families who depend for their income largely on rain-fed land (with inherently a long off-season) and on providing farm labor (landless farmers), this impact would be stronger.

In order to understand the impact, the team interviewed in addition four farm households who had had their first year after such a transition and thus had experienced a full production cycle. This resulted in the following findings:

Women are mostly employed in weeding and planting. Men apply fertilizer and find employment as operators in the mechanized processes of plowing, harvesting, and transporting of the harvest.

Figure 3 - Paddy Cultivation Stages and Division of Labour between Men and Women



Regarding their daily time allocation on a normal day, the interviewees explained that men would get up at 05 a.m., tend to the animals and then depart for the field. Women would start their day usually earlier, at 4 AM preparing the morning and mid-day meals which will be consumed at the field around 7 a.m. and 12. Women will return home around 2 pm, for having a short rest and by 3-4 pm re-attend to the afternoon household chores: buying food

³ Gillian Brown (Senior Gender Advisor), Dr. Ir. M. Yanuar. J. Purwanto (Head of Agricultural and Rural Infrastructure Division, Centre for Research on Engineering Application in Tropical Agriculture), Cynthia Gunawan (Gender Specialist, PRISMA); Astari Widiastomo (Program Officer, DFAT), March/April 2015: 'Gender and Social Inclusion Report',

supplies at the market and cooking the family evening meal. Men tend to stay in the field and end their daily work around 6 p.m. Women will rest after all family members have had their meals. Usually her day ends 9 pm. So, during this busy time, women would work around 16-17 hours a day, while men would work for 10 hours per day.

Having obligations for the daily household activities means that at the times of peak activity in the field, that is when outside labour is employed, women will have to work extra-long hours. They would get up earlier to prepare the food, not only for their own family but also for the labour. They would have made preparations partly during the previous evening. Depending on the volume, this will need less or more time, and they will need to wake up accordingly between 2 – 3 a.m. They will bring the food to the field and help implement the work during the morning. By mid-day prayer time (*dhuhur*) the employed labour will stop their work for the day. Around 2 pm women would return home.

Table 2 - Comparison of Daily Working Hours for male and female farmers

| Husbands | Time | | Wives |
|--|----------------|------------------------------|---|
| Get up, tend animals and get ready for field | 5 AM | 4 AM | Cook meals for family or for the hired labour |
| Work in the field | 5.30 AM – 6 PM | 6.30 AM | Deliver meals for husbands and the labour |
| | | 7 AM – 2 PM | Work in the field |
| | | 2 – 3 PM | Go home and Rest |
| | | 3 – 6 PM | Do house chores, go to market and cook meals |
| Arrives home, has meals and rest | 6PM | 7 PM – 9 PM | Prepare cooking materials for tomorrow |
| Average = 10 – 11 hours | | Average = 15-16 Hours | |

In conclusion, it was found that the above adverse impacts are unlikely to occur on households with farms of reasonable size, because the production process relies much more on paid labor than on family member labor. However, for households that make up a large part of their income with farm labor, the impact might be more substantial. However, the team understands that in fact these households will gain more choice (between various options of finding additional income) and would thus basically be better off than before.

To verify the registration of female farmers, the survey visited the district's Agriculture Service. It has a register of male and female numbers of members of farmer groups. The number of female farmer members is much lower than the number of male members. For example, in Bojonegoro district, out of 210,533 farmer group members registered in the database, only 5% are female. More importantly, 10 out of the 28 subdistricts in Bojonegoro do not report having any female members in the farmer groups. This possibly reflects the invisibility of the role of female farmers.

The roles of women in, and their contribution to, the paddy cultivation process are highly relevant but seem invisible. Indeed, the survey found that in community organizations like HIPPA and BUMDES, women's participation is minimal. The TIRTA team visited eight organizations of which three are active as irrigation services providers⁴ and five are not active because the irrigation service is provided by entrepreneurs. Of the three active organisations, only Gedongarum BUMDES has women on their board, namely as vice-secretary and as treasurer. When asked why there is such a low number of women involved at the organisation's management level, respondents explained that the irrigation management business requires 24 hour attention and is therefore regarded as more suitable for men than for women, because the latter have important domestic responsibilities. This finding is similar to the DFAT Gender Team's observation that only in two out of the seven HIPPAs visited women are involved in the organisation's management.

⁴ BUMDES Kedungprimpren, BUMDES Gedongarum, and HIPPA Klotok.

3.5 PEOPLE WITH DISABILITIES

DFAT aims to ensure that its development activities also reach people with disabilities and improve the quality of their life. For realising this, there are three main objectives to be achieved: (a) enhancing participation and empowerment of people with disabilities; (b) reducing poverty among people with disabilities; and (c) improving equality for people with disabilities in all areas of public life, including service provision, education and employment.

To achieve the three objectives, a twin-track approach will be implemented, including: i) a mainstreaming approach, by actively including people with disabilities as participants and beneficiaries of development efforts across all sectors, and ii) a targeted approach, by targeting people with disabilities in development initiatives designed specifically to benefit people with disabilities⁵.

In order to implement DFAT's strategy for disability-inclusive development, TIRTA has to gain an understanding of the number of people living with disabilities in its target locations. During the stakeholder mapping, the data was collected, as follows:

- a) the presence of people with disabilities in the project target locations (number, education, and livelihood)
- b) availability of district government policies that support people with disabilities to improve their lives
- c) types of productive activities that they undertake and whether or not any of them are actively involved in the irrigation sector
- d) constraints that they encounter in undertaking productive activities

It was found that so far the District of Bojonegoro has no regulations specifically relating to people with disabilities, other than a 'verbal encouragement' by the Bupati for all the line agencies to pay attention to the needs of people with disabilities. For important meetings with district authorities, representatives for people with disabilities are usually invited and can channel their ideas and feedback to the government.

The District's Dinas Tenaga Kerja, Transmigrasi dan Sosial (Disnakertransos) routinely collects information on people with disabilities. The 2014 data show that there are 4,015 adults with disabilities, among which 1,752 women, and 1,398 children (602 female), as detailed in Appendix 5.

People with disabilities in Bojonegoro have established an association called *Himpunan Disabilitas Kabupaten Bojonegoro (HDKB)*. This organisation has become the main partner for District Government to implement various government programs targeting people with disabilities. With the support from Dinakertransos and Dinas Pertanian, HDKB has implemented a range of capacity building programs (such as broidery, fish nursery, crop processing, and *tiram* mushroom nursery).

From nine sampled villages, the survey found quite a high number of people with disabilities (100 people – 54 males and 46 females) with various forms of disabilities such as vision impairment, physical impairment and mental disabilities (see table below). The majority of them have had these impairments since birth. Most did not access education, even though there are *Sekolah Luar Biasa*, (Schools for people with special needs). Only 30% of them undertake productive activities. Examples of productive activities are factory work and animal breeding (goat or duck).

Interestingly, the survey found a case of two people with disabilities being actively involved in pump-lift irrigation services, Pak Muslih and Pak Sucipto. Muslih is an entrepreneur providing irrigation service to Rendeng village, but he is also the head of the same village. The impairments do not stop them to be actively involved in their daily activities. For a profile of Bapak Sucipto, see Appendix 6.

⁵ Development for ALL 2015-2020, Strategy for strengthening disability-inclusive development in Australia's aid program, May 2015

Table 3: People with Disabilities in 9 sampled villages

| Desa | Male | Female | Total |
|--------------------|-------------|---------------|--------------|
| Gedong Arum | 4 | 1 | 5 |
| Kedungprimpen | 18 | 17 | 35 |
| Klotok | 1 | - | 1 |
| Nguken | 2 | 3 | 5 |
| Petak | 3 | 2 | 5 |
| Rendeng | 2 | 1 | 3 |
| Simorejo | 3 | 2 | 5 |
| Sukoharjo | 4 | 3 | 7 |
| Temu | 6 | 8 | 14 |
| Trucuk | 11 | 9 | 20 |
| Grand Total | 54 | 46 | 100 |

4. ENVISAGED SELECTION PROCESS

TIRTA will make an offer of assistance and facilitation to representatives of communities and other stakeholders who express interest in the expansion of irrigation services. TIRTA will invite them to submit an expression of interest with a proposal setting out what they would like to achieve, what they will do to achieve that, and what the difficulties are for which they need assistance/facilitation. TIRTA will provide help with the formulation of the proposal, if needed. Stakeholders will go through a selection process for identifying the ones with best potential. A preliminary set of selection criteria is presented in the next sub-section.

To roll out the selection process, there are several stages that TIRTA will need to undertake, as detailed in Appendix 7 and briefly explained below:

4.1 DISTRICT LEVEL: PROGRAM INTRODUCTION AND CONSULTATIONS

The TIRTA team has carried out its orientation phase and survey phase along the Lower Bengawan Solo over the past six months. In September, prior to the survey, the provincial administration conducted a socialisation workshop in Surabaya to introduce TIRTA to the provincial and district governments. During this period, the team held several consultative meetings with representatives of individual district government agencies, such as Dinas Pertanian and Dinas Pengairan. Now that the survey has been completed, the next step would be a formal meeting with the district administration, to introduce the program. The TIRTA Team envisages a series of meetings with district government agencies.

4.2 VILLAGE LEVEL: TIRTA'S OFFER AND PRIORITISATION/SELECTION

After the agreement at District level, as explained above, the selection process will take place. This will identify a number of irrigation expansion blocks likely to respond most positively to TIRTA's technical assistance, as well as a number of cross-cutting issues constraining the market. The team will develop tailored intervention designs for these; likely including capacity-gap assessments for HIPPA Management (technical capacity and business management), identification of the most economic technical irrigation service arrangements and crop production processes which best fit the new irrigation opportunities. For each directly facilitated expansion, a simple environmental impact assessment will be prepared, as guided by the overall EIA for TIRTA.

Basic steps in the selection process

Step 1 – Preparations: Information packages, meeting schedule, and invitations

Step 2 – Kecamatan level: Introduction of TIRTA to Villages with Potential Expansion Blocks

Step 3 – Expressions of Interest

Step 4 – Shortlisting on basis the Expressions of Interest

Step 5 – Field Verification

5. PRELIMINARY SELECTION CRITERIA

The Table below provides a preliminary list of the selection criteria, for further refinement.

Table 4: Preliminary Selection Criteria for Participation in a TIRTA Intervention

| No | Criteria | Description |
|-------------------------------|--|---|
| Expression of Interest | | |
| 1 | Technical Feasibility | <p>The technical feasibility assessment will verify the location and boundaries of the target irrigation areas, best access to water, and topography, to determine the technical feasibility of the envisaged expansion. Physical aspects of importance are:</p> <ul style="list-style-type: none"> - Land size to be irrigated, - Topography of the area, and - Access to water sources (availability, distance and elevation) |
| 2 | Number of farmers to receive irrigation services | <ul style="list-style-type: none"> - The number of farmers to receive the irrigation becomes crucial because TIRTA has a mandate of reaching 10,000 smallholder farmers. - Includes details on the number of women-headed farming households, women farmers, and farming households with family members living with disabilities |
| 3 | Cost of the intervention relative to the outreach | <ul style="list-style-type: none"> - This would be a key criteria considering the value for money principle. |
| 4 | Clear commitment to support the irrigation schemes | <ul style="list-style-type: none"> - The proposal is signed by the relevant community organisation leaders (e.g. the HIPPA Board) as well as the village head, and by the sitting entrepreneur service provider, if applicable. - The village government plan and budget allocation for the fiscal year shows a strong commitment to support irrigation development (information required: total amount of the Village Development Budget (APBDes); the key activities in the budget that support irrigation and the related budget <p>Notes: The two signatory application system, implies that there should not be an ongoing conflict between the farmer association and the village head. Provision of APBDes information shows that village budget management is transparent, which indicates good governance.</p> |
| 5 | Availability and capacity of Service Provider | Communities that already have (identified) a proven service provider (entrepreneur, HIPPA, or BUMDES) will have a higher chance to be selected by TIRTA. The field verification team will assess the service provider's capacity to determine the need for capacity development support as part of the intervention. |
| 6 | Low risk of conflict potential | Conflict over natural resources and vested business interests may emerge when major changes are made to existing situations. The team needs to avoid working in areas where such conflicts are likely. The field verification should clarify whether there are any conflicting interests. This includes consulting the residents of the village where the water source is located and the owners of the land passed over by pipes or canals. |

6. ATTENTION TO GENDER AND SOCIAL INCLUSION

TIRTA will promote social norms and perceptions that raise women's social status and contribute to greater gender equality, particularly in the irrigation services environment covered by its interventions. This will include the following actions as part of a gender action plan:

- a) *Team capacity:* The team will be trained in recognising and addressing the gender issues.
- b) *Intervention selection:* Proposed intervention concepts which promote women roles and participation in the irrigation service management will score higher in the selection process. One of the key requirements for intervention proposals will be for beneficiary level data (e.g. from the community) to be gender disaggregated and include information such as women-headed farmer households, and households with members living with disabilities.
- c) *Intervention design:* Tirta teams will consult both men and women in village governments, irrigation-related village organisations, and farmer community, in order to have a better understanding of how the intervention will/can impact and formulate mitigation for any identified adverse impacts, including consideration of trade off and opportunity cost effects.
- d) *Intervention implementation:* TIRTA can implement activities that have strategic value to promote women's roles in irrigation service and anticipate for any possible negative impacts on women of activities implemented. TIRTA can facilitate specific activities (e.g. training) to include or target specifically women to increase their capacity and competitiveness to be able to participate in the community organizations. Even for activities that are not targeting women specifically, TIRTA should be mindful of opening them up for women and of needing to avoid any possible negative impacts to women.
- e) *Monitoring and measurement -* A monitoring system that can capture the participation of men and women (gender disaggregated data) is essential. To this end, TIRTA will
 - a. ensure that the list of program participants, available from the start of the intervention, will be regularly updated and consulted during impact assessments
 - b. undertake specific in-depth studies to dig deeper and recognise the impacts improved irrigation services (will) have for men and women, such as in terms of participation, decision-making and control over household financial resources, types of income sources, and preferences over the use of incomes, and identify trade-offs, opportunity cost and displacement aspects related to the increased number of planting seasons.

There is a high possibility that the number of people living with disabilities would be quite significant in the villages where TIRTA will work. TIRTA should then make sure that their families participate as TIRTA's beneficiaries and receive the improved irrigation services. This will provide the family with a means to increase their incomes and improve their living. The project monitoring system should be established and capable to track whether these families do benefit from the project. If the monitoring system finds that for some reasons these families are obstructed from receiving the benefits of the project, a deliberate effort should be made by the project to address it. As an example, during the selection process, the village that includes families with disabilities in the recipient list of irrigation service will have a better chance to be selected by TIRTA.

7. MANAGING RELATIONS TO GOVERNMENT

7.1 NATIONAL LEVEL

TIRTA is one of the sub-programs under AIP-Rural, a Government to Government cooperation between Indonesia and Australia. TIRTA's activities relate to three levels of government. At the national level, coordination and communication will be through the Program Coordinating Committee (PCC) forum, co-chaired by DFAT and the Directorate of Irrigation and Swamps (Ministry of Public Works). The PCC provides strategic direction and decision making of the program.

7.2 PROVINCIAL LEVEL

At the provincial government level, TIRTA's principal relation is with the Provincial SekDa and Bappeda, especially the International and Overseas Cooperation Bureau, overseeing donor programmes and directing government contributions. Relevant technical agencies include Dinas Pertanian and Pengairan, but only to quite a limited extend, because TIRTA's activities are small scale and fall under the district administration's responsibility.

AIP Rural has developed seven specific strategies for information sharing and introduction to local governments of the AIP Rural programs. The PRISMA Provincial Managers have been assigned as the focal point for coordination on all communication between the programs and the local governments.

7.3 DISTRICT LEVEL

After the establishment of coordination, communication, and cooperation mechanisms, TIRTA will conduct communications with district level agencies directly. There are four district level agencies that TIRTA should maintain close collaboration with, namely Bappeda, Dinas Pertanian, Dinas PU Pengairan and BPMPD.

The Table below lists TIRTA's strategies for liaising with government.

Table 5: Different Levels of Government Involvement

| Liaison category | Strategy | Relevant Government Agencies |
|--|---|---|
| Information Sharing | <p>In September 2015, TIRTA was introduced to provincial and district stakeholder agencies in a provincial level meeting.</p> <p>TIRTA needs a formal launching of its program at the district level.</p> <p>The TIRTA team will provide monthly reports (to be submitted before the 8th of the month) on its activities via the PRISMA Provincial Manager to both provincial and district government agencies.</p> <p>The TIRTA team in Bojonegoro will regularly share information with relevant district agencies.</p> | <p>Provincial Level Agencies:</p> <ul style="list-style-type: none"> - Sekda and Bappeda - International and Overseas Cooperation, - Dinas Pertanian - Dinas PU Pengairan <p>National Level Agencies:</p> <ul style="list-style-type: none"> - Balai Besar Wilayah Sungai Bengawan Solo (BBWS) <p>District Level Agencies:</p> <ul style="list-style-type: none"> - District Secretary Office - Bappeda - Dinas Pertanian dan Pengairan - BPMPD |
| Coordination and Technical Consultation | <p>Coordination and Technical Consultation will be required throughout the program implementation on:</p> <ul style="list-style-type: none"> - Agreement on TIRTA's selection procedure and criteria - Development of synergies with district government in regards to its irrigation development programs, | <p>District Level Agencies:</p> <ul style="list-style-type: none"> - Dinas Pertanian - Dinas PU Pengairan - BPMPD <p>National Level Agencies:</p> <ul style="list-style-type: none"> - Balai Besar Wilayah Sungai Bengawan Solo (BBWS) |

| | | |
|--|---|--|
| | <p>such as 'Klitek-Malo', which appear to be much more challenging than anticipated</p> <ul style="list-style-type: none">- TIRTA interventions in schemes that have received assets (e.g. irrigation systems and pumps) from the district government- Water allocation and water rights | |
|--|---|--|

8. ASSESSING IMPACT

8.1 DEFINING SMALLHOLDER FARMER INCOME

As mentioned in Section 1, TIRTA's goal is for 10,000 smallholder farmers to increase their incomes by at least 60%. Clear and agreed definitions of what the term 'smallholder farmers' means and what income the 60% increase refers to will help the development of the TIRTA Team's implementation strategy and methodology, as well as determining an appropriate system for measurement of impact.

Since a smallholder farmer's income sources are typically strongly diversified as an integral part of rural livelihood strategy, and the part of his income gained from crop cultivation may well be minor compared to the total, it is therefore important to define where the 60% increase refers to. The team understands that the increase in income above relates specifically to the increase in net-income gained by a farmer as a result of improved access to water through pump-lift irrigation.

8.2 PROGRAM IMPACT ASSESSMENT: PRIMARY AND SECONDARY BENEFICIARIES

It would be possible to distinguish categories of beneficiaries according to whether TIRTA impacts directly (primary beneficiaries) or indirectly (secondary beneficiaries) on them. Of the two categories, TIRTA's impact goal (above) clearly refers to the primary beneficiaries, namely the farmers/small-holders. However, TIRTA's impact is wider. The team found that farmers, including those who cultivate very small sizes of land, procure various goods and services for their paddy production, mostly locally, i.e. within the village or at the sub-district centre. Therefore, an increase in land gaining access to irrigation, will result in increased demand for those goods and services. This increased demand will stimulate the proliferation of small enterprises. Indirect beneficiaries would include those who provide irrigation services, tractor services, paddy seedling ('nursery businesses'), farm labour for land preparation, planting, weeding and harvesting, and agricultural inputs.

Service providers enjoying increased incomes due to an expansion of their business, and possibly an improved return on investment, will become more viable. Viable business enterprises operating in an enabling environment will guarantee the sustainability of the irrigation services to the smallholder farmers as they will be able to sustain their irrigation services and expand even further generating continued growth.

TIRTA could attempt to assess and understand the scale of impact on the secondary beneficiary group as well. In that case, the impact assessment could be limited to the most relevant groups, being the small enterprises, situated in and around the target villages, directly supporting the paddy cultivation process and the irrigation services. This would then exclude the larger enterprises such as fertilizer sellers, banks and microfinance institutions.

Appendix 1: Stakeholder Matrix - Irrigation Services

| Stakeholder | Roles | Interest | Resources and Capacity | Position toward TIRTA's goal |
|--|---|--|---|--|
| A. Key Stakeholder | | | | |
| Farmers | <ul style="list-style-type: none"> • Cultivate paddy • Pay irrigation service fees • Elect HIPPA/BUMDES management • Elect Kepala Desa | Obtain water to increase their paddy cultivation and improve livelihood. | <ul style="list-style-type: none"> • Land for cultivation (owned or rent). • Farming skills and experience • Access to various goods and services suppliers to support paddy cultivation. | (Pro) Farmers who don't have access to water for irrigation are enthusiastic with the possibility to get water and have more than one paddy cultivation in a year. |
| HIPPA / BUMDES | <ul style="list-style-type: none"> • Manage water users. • Maintain the irrigation system. • Run the pump stations and make sure that water is distributed fairly to members. • Collect irrigation fees. • Manage HIPPA /BUMDES to be profitable for sustainable services. | Profitable enterprise to sustain services. | <p>HIPPA and BUMDES that the TIRTA Team met have varying degrees of capacity. For active HIPPA/BUMDES they would have some capacity as the following;</p> <ul style="list-style-type: none"> • Experience in managing irrigation service. • Active members. • Operational and management team to handle the services. • Existing irrigated land and target expansion. | <p>(Pro) Active HIPPA/BUMDES will be enthusiastic to be involved with TIRTA.</p> <p>Non-active HIPPA/BUMDES will require a longer time to build commitment and capacity.</p> |
| Entrepreneurs (Pegusaha Pompa / Areal) | <p>Run the pump stations and make sure that water is distributed fairly to the clients.</p> <p>Collect irrigation fees</p> | Profitable business and long term engagement with the village. | Varying capacity that the team found from small scale (ground water pump) to large scale enterprise serving an area > 500 ha and employing staff to operate and maintain the station and to collect fees. | (Mixed) Entrepreneurs will be highly motivated to take part if there is clear potential for expansion. They can be reluctant for expansion idea when they are not certain that the village will respect the contract timeframe (sudden termination of contract). |

| Stakeholder | Roles | Interest | Resources and Capacity | Position toward TIRTA's goal |
|---|--|---|--|--|
| Supporting Stakeholders | | | | |
| Financial Institutions (BRI, Bank Jatim, BPR, UPK PNPM) | Offer loans that can be used for investment and working capital. | Profit from the loans. | Various products for small and medium enterprise. The loan can reach Rp. 500 millions. Bank Jatim, BPR and UKP PNPM have provided loans for pump lift irrigation business. | (Pro) There are many loan products that the investors can get access to. TIRTA can assist the partners in selecting which loan product is more suitable for their needs and capacity. |
| Pump Suppliers | Provide two kinds of pumps (home-made assembly) and official brand pump. | Profitable business. Official pump distributors would be interested to also provide technical advice for the design and installation. | Local stores in Surabaya provide home assembled pumps and imported pumps from China. An official supplier such as Torishima is willing to provide technical advice for the design to fit with the need of the irrigation schemes. | (Pro) PT Torishima is a potential partner to be involved in supporting the intervention especially for large models of irrigation schemes. They can provide the technical advice during the design, installation and operational of the pumps. |
| Pump Repair Shop | Offer repair services not only to machines for irrigation but also for paddy milling | Profitable business and continued engagement with the clients. | Skills and experience in repairing the pumps (from 6 – 20 dim). The shops have provided services to clients in Lamongan and Bojonegoro. Offers on-site repair and repair at the shop. Employs both staff at the shop and on-site mechanics. | (Pro) Willing to collaborate and quite open to share information about their business regarding pricing and annual profit. |

TIRTA – Survey stage 2 – Results and Initial Analysis

| Stakeholder | Roles | Interest | Resources and Capacity | Position toward TIRTA's goal |
|--|--|--|--|--|
| PLN and Subcontractors (AKILI and AKLINAS) | Provide installation service and electricity supply for the pump stations. | Profitable business from the services provided. | Technical Staff. Standard Operating Procedures. Several products to offer to the public. Experience in the installation of electricity for the existing pump stations. | (Neutral) State owned electricity company with critical role to supply electricity for the pump station. Of the various electricity products offered to public, TIRTA can assist the investors to choose the most cost efficient. |
| PERTAMINA (State owned oil company) | Sells fuel to public. | Profitable business. | Availability of diesel fuel at the PERTAMINA outlets all over the country. | (Neutral) Not directly related to TIRTA. Pertamina provides fuel to public. |
| Policy Stakeholders | | | | |
| Village head (=Kepala Desa) | Run the village administration including the governance matters, village development and empowerment of the communities. | Ensure that the villagers' productive activities are sufficiently supported with (annual fund, infrastructure and facilities). | Highest authority in the village. Ability to organize the villages. Overall responsibility to supervise village organisations and village owned enterprises. An important figure to lead the negotiation with the adjacent villages for the irrigation expansion. | (Mixed) Key figure in the village, an entry point before interventions can be implemented in the village. There will be the potential to work with two types of village heads; the "facilitator type" and "empowerment type" (see analysis on village government). There is a risk that village heads who also have business of pump-lift irrigation will be |

TIRTA – Survey stage 2 – Results and Initial Analysis

| Stakeholder | Roles | Interest | Resources and Capacity | Position toward TIRTA's goal |
|------------------|---|--|--|--|
| | | | | resistant to TIRTA if the objective is to have a transition of the management to HIPPA / BUMDES. |
| Local leaders | Informal and formal (through village council) participation in village decision making. | Ensure that the decisions made by the village head are to serve the villagers' needs and interests. | Members of the community who can voice opinions and advice to the village head. The formal body (village council or BPD) has a role in overseeing the performance of Kepala Desa. | (Pro) TIRTA's role will be to help communities to increase their access to irrigation. However, where a local leader provides irrigation services, he is likely to see TIRTA as a business threat. In areas currently by ground-water irrigation chances of this situation occurring is highest. |
| Bupati | Responsible for district level administration and implementing development programs. | To keep political promises during the campaign through the implementation of various development programs elaborated in five year term and annual plans. | All the government machineries (line agencies) and funds to implement development programs such as 1,000 water catchments, distribution of pumps, or harvest insurance programs). | (Pro) TIRTA's goal is in line with the Bupati's vision and missions. As an example, Bupati of Bojonegoro has a vision to make Bojonegoro as the paddy barn for Indonesia. |
| Subdistrict head | Responsible for coordination of subdistrict administration, public services, and community empowerment. | Fulfil the main tasks (governance, empowerment, coordination and supervision) as mandated by the law. | Annual Budget. Authority over the subdistrict area can facilitate the communication among villages and act as a bridge for the villages to communicate with district agencies. | (Pro) Their main role will be crucial in influencing stakeholders at the sub-district level (such as HIPPA/BUMDES, Kepala Desa, UPTD, MFIs) or at the district level (Technical Agencies) to support the TIRTA Project. |

TIRTA – Survey stage 2 – Results and Initial Analysis

| Stakeholder | Roles | Interest | Resources and Capacity | Position toward TIRTA's goal |
|--------------------|--|--|---|--|
| Bappeda | Coordination Body at District level, responsible for the coordination of plans, budgets and performance. | Development programs are in line with Bupati's vision and missions. Budgets are spent in a timely manner according to the annual plan. | Coordination role for the planning at the district level. Authority to facilitate coordination with other line agencies (PU Pengairan and Pertanian). Bappeda has specific programs that they implement on their own. For Bojonegoro, Bappeda has a program to strengthen the capacity of BUMDES. | (Pro but cautiously) Regular coordination should be held with Bappeda for the institution to understand TIRTA and receive updates on TIRTA's activities. Having this understanding, Bappeda will be at ease to facilitate various meetings or resolve problems with technical agencies. The relationship with Bappeda may be potentially counterproductive if it is too frequent or infrequent. Too much contact will encourage more involvement in the project management however less frequent will alienate them from TIRTA and will have no support when dealing with technical agencies. |
| Dinas PU Pengairan | Implement development programs for water resource management and irrigation. Its main functions are to manage, provide services, supervise | Ensure that the programs implemented for water resource management and irrigation are in line with Bupati's vision and missions and national priorities. | Bupati has various programs such as 1,000 water catchments, management of 62 irrigation areas of non-Pacal reservoir, capacity development of HIPPA board members and have staff in the field known as Mantri Air. | (Pro) Would support TIRTA's project due to shared goal and interest. Information should be shared regularly to this technical agency and communication should be maintained. |

TIRTA – Survey stage 2 – Results and Initial Analysis

| Stakeholder | Roles | Interest | Resources and Capacity | Position toward TIRTA's goal |
|-----------------|---|---|--|---|
| | and control the use of water resources. | | | |
| Dinas Pertanian | Implement government programs in agricultural sectors, including providing irrigation facilities and infrastructure to support the agricultural activities and provide extension services to the farmers/HIPPA. | Ensure that the development in agricultural sectors is in line with Bupati's vision and mission and national priorities | Dinas Pertanian has several ongoing programs in Bojonegoro: Strengthening of HIPPA. Facilities and infrastructure for JITUT/JIDES. Distribution of pumps for farmers living along Bengawan Solo. Distribution of ground water pumps for farmers living far from Bengawan Solo. Extension service for farmer groups. Plan to implement harvest failure insurance for farmers. | (Pro) Would support TIRTA's project due to shared goal and interest. Information should be shared regularly to this technical agency and communication should be maintained. |
| BBWS | Official Government Institution that manages Bengawan Solo River basin. | Water source management for conservation, water usage, and disaster caused by the water. | Official regulator for Bengawan Solo and the institution that issues technical recommendations. | (Pro) The head of BBWS has positive views of TIRTA's project and support efforts to introduce ways for efficient use of water from Bengawan Solo to increase farmers' production. |

TIRTA – Survey stage 2 – Results and Initial Analysis

Appendix 2: Farmers: production and income

| | Land Size Criteria | Total Farmers | Total land size (ha) | Total Harvest (ton) | Total Production Cost (Rp) | Total Income (Rp) | % of production cost over income | Net income per individual (Rp) | Net Income per ha (Rp) | Annual net Income per ha (Rp) | Ave Land Size (Ha) |
|---------------------------------------|--------------------------------------|------------------|-------------------------------|---------------------------|-------------------------------------|-------------------------|---|--------------------------------------|------------------------------|-------------------------------------|-----------------------------|
| With Irrigation (N=35) | All land sizes (0.1 – 5 ha) | 35 | 36.3 | 205.8 | 530,083,814 | 992,890,175 | 0.53 | 28,368,290.71 | 27,352,346.42 | *56,736,581 | 1.04 |
| | <2 ha | 30 | 17.7 | 112.9 | 263,482,421 | 578,238,300 | 0.46 | 19,274,610.00 | 32,668,830.51 | *65,337,661 | 0.59 |
| Rain Dependent (N=17) | All land sizes (0.2 – 2 ha) | 17 | 9.56 | 56.4 | 186,892,900 | 213,536,875 | 0.88 | 12,560,992.65 | 22,336,493.20 | **22,336,493.20 | 0.56 |
| | <2 ha | 16 | 7.56 | 37.81 | 102,900,400 | 179,848,750 | 0.57 | 11,240,546.88 | 23,789,517.20 | **23,789,517 | 0.47 |

* Two planting seasons, ** One planting season

Notes: Out of the total 52 farmers interviewed, TIRTA survey found that 35 farmers with pump-lift irrigation planted two seasons per year and 17 farmers without access to pump lift irrigation only planted one season per year. As anticipated a comparison of incomes between farmers with access to irrigation and those without access to irrigation indicates a significant difference in annual net income. Farmers with access to water have relatively higher annual income than those without irrigation (see table 3). This is because they do not only benefit from higher yield but also from the total incomes of two harvests instead of only one harvest per year.

TIRTA – Survey stage 2 – Results and Initial Analysis

Comparison of Annual Paddy Production cost and Irrigation Service Fees

| Farmer | *Tasir | *Mat | *Lasmujiono | *Suntoro | *Kasmuri | **Ali |
|---|--------------|--------------|--------------|--------------|---------------|------------|
| Village | Leran | Rendeng | Tulungrejo | Prambonwetan | Kedungprimpen | Banaran |
| Type of Irrigation | Well | B.Solo | B.Solo | B.Solo | B.Solo | Rainfed |
| Service Provider | Entrepreneur | Entrepreneur | Entrepreneur | Entrepreneur | BUMDes | |
| Land Size (ha) | 0.36 | 0.25 | 0.5 | 0.3 | 1.5 | 0.5 |
| Irrigation Service Fee | 1/4 | 1/4 | 1/5 | 1/6 | 1/7 | - |
| Production (ton) | 2 | 1.7 | 3.85 | 3.5 | 7.605 | 3 |
| Gross Income (Rp) | 13,500,000 | 15,600,000 | 34,650,000 | 31,500,000 | 68,445,000 | 13,500,000 |
| Production Cost (Rp) | 9,300,000 | 7,370,000 | 14,185,000 | 10,810,000 | 20,697,857 | 3,315,000 |
| ISF Proportion out of Production Cost (%) | 48% | 53% | 48% | 58% | 47% | - |
| Net Income (Rp) | 4,200,000 | 8,230,000 | 20,465,000 | 20,690,000 | 47,747,143 | 10,185,000 |
| Equivalent Net Income per Ha (Rp) | 11,666,667 | 32,920,000 | 40,930,000 | 68,966,667 | 31,831,429 | 20,370,000 |

* Two planting seasons, ** One planting season

Notes: The irrigation fees that farmers pay are in the range of 1/3 to 1/7 of their total harvest. Community Organization such as BUMDES charges the lowest irrigation fee at 1/7 of the total harvest. Ground water entrepreneurs charge the highest irrigation service fee at 1/3 of the total harvest. For farmers with access to irrigation (ground water and pump-lift irrigation), the proportion of the service fees are between 47% -58% of their total production cost. Despite having to pay such high irrigation cost, farmers with pump-lift irrigation still enjoy higher annual incomes than rain dependent farmers.

Appendix 3: Interviewed entrepreneur/investors

| No | Entrepreneur Names | Address | Coverage area | Pump Stations | Irrigation Service Fees | Types of Services | Within Village / Across boundaries | Number of Village covered | Expansion Plan |
|----|--------------------|-------------------------|---------------|---------------|-------------------------|---|------------------------------------|---------------------------|------------------------------|
| 1 | Latief | Sukoharjo-Kalitidu-BJR | 5 | 1 | 1/4 | Provides Water | Within Village | 1 | None |
| 2 | Abdul Hamid | Leran-Kalitidu-BJR | 5 | 1 | 1/3 | Provides Water | Within Village | 1 | None |
| 3 | Hadi Pranoto | Ngringrejo-Kalitidu-BJR | 7 | 1 | 1/4 | Provides Water | Within village | 1 | None |
| 4 | Arief Saifudin | Nguken -Ngraho BJR | 75 | 1 | 1/5 | Provides Water & Buys paddy | Across Village Boundaries | 3 | 250 ha |
| 5 | Muslih, ST | Rendeng-Malo BJR | 75 | 2 | 1/4 and 1/5 | Provides Water | Across Village Boundaries | 4 | 50 ha |
| 6 | Jayus | Simo,Soko-TBN | 190 | 5 | 1/5 | Provides Water | Across sub-district boundary | 2 | None |
| 7 | Haji Makmur | MojoAgung,Soko-TBN | 360 | 7 | 1/5 | Provides Water, Agriculture Inputs, & Buys Paddys | Across district boundary | 2 | 200 ha |
| 8 | Haji Moh Achin | Pilangede,Balen-BJR | 210 | 4 | 1/5 | Provides Water & Buys paddy | Across sub-district boundary | 2 | Depending on potential areas |
| 9 | Sudarwadi | Prambonwetan,Rengel-TBN | 426 | 1 | 1/5 | Provides Water | Across Village Boundaries | 4 | 50 ha |
| 10 | H. Untung Basuki | Bojonegoro | 565 | 7 | 1/5 | Provides Water & Buys paddy | Across Village Boundaries | 5 | Malo (500ha) |

TIRTA – Survey stage 2 – Results and Initial Analysis

Appendix 4: Service providers: asset value and income

| No | Name | Address | Service Provider Type | Coverage Area (ha) | Asset Value (Rp) | Value (Rp) | Production Cost (Rp) | Revenue (Rp) | Net (Rp) | Income (Rp) |
|----|----------------------------------|--------------------------|---------------------------|--------------------|------------------|---------------|----------------------|---------------|----------|-------------|
| 1 | Abdul Hamid (MK II 2015) | Sukoharjo, Bojonegoro | Enterpreneur (Well) | 5 | 62,037,500 | 20,416,667 | 48,750,000 | 28,333,333 | | |
| | | | | per ha | 12,407,500 | 4,083,333 | 9,750,000 | 5,666,667 | | |
| 2 | Hadi Pranoto | Ngringinrejo, Bojonegoro | Enterpreneur (B.Solo) | 7 | 42,000,000 | 8,943,750 | 37,800,000 | 28,856,250 | | |
| | | | | per ha | 6,000,000 | 1,277,679 | 5,400,000 | 4,122,321 | | |
| 3 | Muslih | Rendeng, Bojonegoro | Enterpreneur (B.Solo) | 75 | 489,717,000 | 318,462,500 | 464,062,500 | 145,600,000 | | |
| | | | | per ha | 6,529,560 | 4,246,167 | 6,187,500 | 1,941,333 | | |
| 4 | Haji Makmur (MK III, 2015) | Mojoagung, Tuban | Enterpreneur (B.Solo) | 360 | N/A | 1,358,000,000 | 1,944,000,000 | 586,000,000 | | |
| | | | | per ha | N/A | 3,772,222 | 5,400,000 | 1,627,778 | | |
| 5 | Sudarwaji (MK II, 2014) | Prambonwetan, Tuban | Perseroan Komanditer (CV) | 426 | 2,146,500,000 | 924,731,974 | 1,140,300,950 | 215,568,976 | | |
| | | | | per ha | 5,038,732 | 2,170,732 | 2,676,763 | 506,030 | | |
| 6 | BUMDES Gedongarum (MK II, 2015) | Gedongarum, Bojonegoro | Village Business Unit | 505 | 1,123,518,468 | 1,195,529,704 | 2,828,500,000 | 1,632,970,296 | | |
| | | | | per ha | 2,224,789 | 2,367,386 | 5,600,990 | 3,233,605 | | |
| 7 | HIPPA Subur Makmur (MK II, 2015) | Klotok, Tuban | Community Group | 644 | 3,268,102,000 | 948,142,606 | 3,843,387,350 | 2,895,244,744 | | |
| | | | | per ha | 5,074,693 | 1,472,271 | 5,967,993 | 4,495,722 | | |

* MK (*Musim Kemarau – Dry Season*), MK II means the 2nd planting of dry season)

Tertiary Irrigation Technical Assistance: Tirta

Gender and Social Inclusion Report

March/April 2015

Summary for TIRTA Team use

Observations and analysis:

- Records and statistics overlook the fact that many women own land, that most of the work in producing rice is carried out by women, and women make additional significant agriculture and non-farm contributions to the household income. Women are almost absent from decision-making.
- A main reason for this is that social and cultural norms render their contribution invisible, among others because their work is unpaid and therefore accorded little value
- Particularly women of the poorest families may potentially enjoy benefits from increased paid farm labour opportunities; however, opportunity costs due to increasing labour requirements of female family workers need to be considered.

Recommendations:

- Asset ownership and labour contributions of women should be made visible and valued. To do so, the following steps will be needed:
 - The managing contractor's team need to be trained to recognise and address the invisibility of women's contribution.
 - A gender action plan needs to be prepared with specific time bound actions and targets. The implementation needs to be monitored and regularly reported on.
 - The monitoring frameworks need to be designed so that they capture the asset ownership and economic contributions of women, and take into account the complexity of households income and trade-offs in allocation of time.
 - Panel surveys that include families where women own land, families that rent land, and families where women work as paid farm labourers, would help to understand some of the broader distributional impacts of TIRTA.
 - Interventions need to be tailored to take account of the contribution women make to rice production by ensuring their full participation in decision-making, learning programs, and access to inputs. This may involve separate meetings and training for women farmers.
 - HIPPA and investors need training and guidance on how to include women in decision-making, and how to encourage them to take up paid opportunities.
- A consistent and proactive approach could also contribute to altering social norms and perceptions, raising women's social status, and contributing to greater gender equality in the community.

Source: Gillian Brown (Senior Gender Advisor), Dr. Ir. M. Yanuar. J. Purwanto (Head of Agricultural and Rural Infrastructure Division, Centre for Research on Engineering Application in Tropical Agriculture), Cynthia Gunawan (Gender Specialist, PRISMA); Astari Widiastomo (Program Officer, DFAT), March/April 2015: 'Gender and Social Inclusion Report',

Appendix 6: Kabupaten Bojonegoro – Numbers of disabled residents, 2014

| No | Kecamatan | Anak Dengan Disabilitas | | | Penyandang disabilitas | | |
|--------|-------------|-------------------------|-----|-------|------------------------|-------|-------|
| | | L | P | Jml | L | P | Jml |
| 1 | Kedawan | 16 | 11 | 27 | 20 | 20 | 40 |
| 2 | Tambak rejo | 28 | 16 | 44 | - | - | - |
| 3 | Kapohbaru | 35 | 17 | 52 | 190 | 143 | 333 |
| 4 | Gondang | 25 | 14 | 39 | 46 | 34 | 80 |
| 5 | Kedungadem | - | - | - | 109 | 114 | 223 |
| 6 | Bubulan | 13 | 4 | 17 | 77 | 38 | 115 |
| 7 | Ngasem | 40 | 31 | 71 | 74 | 57 | 131 |
| 8 | Ngraho | 54 | 52 | 108 | - | - | - |
| 9 | Balen | 35 | 11 | 46 | 105 | 37 | 142 |
| 10 | Kasiman | 12 | 8 | 20 | 49 | 44 | 93 |
| 11 | Kapas | 44 | 21 | 65 | 148 | 100 | 248 |
| 12 | Dender | 55 | 61 | 116 | 179 | 237 | 416 |
| 13 | Padangan | 22 | 31 | 53 | 145 | 91 | 236 |
| 14 | Malo | 15 | 8 | 23 | 18 | 12 | 30 |
| 15 | Sugihwaras | 25 | 22 | 47 | 76 | 54 | 130 |
| 16 | Subarrejo | 41 | 38 | 79 | 190 | 135 | 325 |
| 17 | Gayam | 21 | 19 | 40 | 16 | 17 | 33 |
| 18 | Ngambon | 6 | 6 | 12 | 19 | 13 | 32 |
| 19 | Purwosari | - | - | - | 151 | 119 | 270 |
| 20 | Trucuk | 19 | 15 | 34 | 126 | 73 | 199 |
| 21 | Bojonegoro | 68 | 52 | 120 | 54 | 30 | 84 |
| 22 | Sukosewu | 26 | 25 | 51 | - | - | - |
| 23 | Baurano | 65 | 39 | 104 | 281 | 207 | 488 |
| 24 | Kanor | 52 | 42 | 94 | - | - | - |
| 25 | Temayang | 41 | 26 | 67 | 12 | 2 | 14 |
| 26 | Sekar | 14 | 17 | 31 | 116 | 117 | 233 |
| 27 | Margomulyo | 9 | 8 | 17 | 43 | 39 | 82 |
| 28 | Kalitidu | 15 | 8 | 23 | 20 | 18 | 38 |
| JUMLAH | | 796 | 602 | 1.398 | 2.263 | 1.752 | 4.015 |

Source: Disnakertransos Kab. Bojonegoro

Appendix 7: Working with a disability: Bapak Sucipto



Sucipto, 41 years old, works as a supervisor in HIPPA Klotok. Although, he cannot participate in field activities, he contributes by participating in HIPPA management and supervising the HIPPA management and submits his report to the Kepala Desa. Each week, he assists the HIPPA to verify the receipts of their expenses. During the conversation, Sucipto came across as a visionary person sharing his thoughts on HIPPA and the service for the farmers.

Back in 2002, he had an accident that caused his arm to be amputated. This has not stopped Sucipto from undertaking his daily activities. For example he can still ride a modified motorcycle. So far he has not received any training support from the local government (Tuban) and therefore expects for more supports to be provided by the Government.

Appendix 8: Detailed activities in the selection process

The TIRTA Team envisages a series of meetings with district government agencies, with specific agendas, as follows:

Formal introductions

Objective/main outputs

A formal launching of TIRTA and to establish arrangements for further technical discussions between TIRTA and relevant technical agencies.

Key agenda items:

- Explain what TIRTA is about and the legal basis of the program
- Reiterate the informal communications during the 6 months survey period and report key survey findings
- Share TIRTA's plan for 2016

Notes:

- Bappeda should be the leading agency in this meeting, with attendees coming from various government agencies such as Dinas Pertanian, Dinas PU Pengairan, BPMPD, and BBWS.
- In case the option is for a multi-district meeting, then the involvement of Provincial SekDa and/or Bappeda is required.
- From AIP Rural's side, the Provincial Manager of PRISMA is the focal point for communication and coordination with local governments.
- Since this is a first formal meeting with the district administration(-s), participation by the AIP Rural Secretariat and DFAT would help clarify TIRTA's legal basis.

Consultation of Selection Criteria and Process

Objective/main outputs

Agreement on selection process and criteria.

Notes:

- Hold discussions with various technical agencies on the process and criteria.
- Possible need to negotiate modifications to the selection criteria. Stakeholder analysis indicated that Bappeda and BPMPD may want to promote prioritization of villages which have a BUMDES and the BUMDES as the service provider; Dinas Pertanian may want to keep interventions out of areas where they have introduced ground water pumping and promote a focus on areas that are included in their program for provision of large capacity pumps, such as Kliteh-Malo.
- Possible need to decide on involvement of agencies in the selection team.

After agreement at District level, as explained above, the selection process proper takes place:

Step 1 – Preparations: Information packages, meeting schedule, and invitations

The TIRTA team will develop information packages for distribution to meeting participants. These will explain what TIRTA is about, what mode of technical assistance TIRTA can provide, the selection process and criteria, and the application form with explanation.

The application form will be simple so that applicants can easily fill in the required information. The form will include:

- a) A cover letter signed jointly by the village head and chairman of the farmer association or village business unit. If *Pengusaha* has been identified, s/he can also co-sign the cover letter.
- b) Additional data to be included as attachments to the cover letter include:

TIRTA – Survey stage 2 – Results and Initial Analysis

- Data on target irrigated land (Size and Locations).
- Information on topography.
- Gender disaggregated data of farmers to receive the irrigation and additional on women headed farmer household and families with people living with disabilities.
- Information related to the Village Development Budget (APBDes): total budget, activities to support irrigation and their respective budget allocations) with a copy of the APBDes summary to support the numbers.

The team will also prepare field verification forms and tools for use in Step 5.

Step 2 – Kecamatan level: Introduction of TIRTA to Villages with Potential Expansion Blocks

Participation by representatives of village governments and community organisations (farmer groups, HIPPA, BUMDes) with potential for expansion of irrigation services, as identified during the survey.

Step 3 – Expressions of Interest

Step 4 – Shortlisting on basis the Expressions of Interest

All the expression of interest will be assessed and scored against criteria and then ranked. The EoI's at the top of the list will be the ones of most interest to TIRTA for interventions in early 2016.

Step 5 – Field Verification

The team will verify information related to:

- Physical aspects (GPS data of potential irrigated areas taken, topography information, and access water sources).
- Technical feasibility.
- Number of farmers.
- Key stakeholders' commitment (investor, farmer associations, village/sub-district governments).
- Capacity of potential service providers
- Potential risk of conflicts.

The above process will identify a number of irrigation expansion blocks likely to respond most positively to TIRTA's technical assistance. The team will develop tailored intervention designs for these blocks, and these will require capacity-gap assessments for HIPPA Management (technical capacity and business management), best economic crop production processes, best fitting the new irrigation opportunities, and include a simple environmental impact assessment.