



## **IRRIGATION MANAGEMENT NETWORK**

### **GROUNDWATER DEVELOPMENT ON MADURA, INDONESIA: GENDER ISSUES IN AN IRRIGATION PROJECT**

**Margaret Casey**

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# GROUNDWATER DEVELOPMENT ON MADURA, INDONESIA: GENDER ISSUES IN AN IRRIGATION PROJECT

Margaret Casey

## 1. INTRODUCTION

This paper examines the impact of a groundwater irrigation project upon women in Madura, Indonesia. Madurese women are traditionally responsible for many aspects of agricultural production, i.e. as primary producers, farm managers, processors of foodstuffs, and traders. They are also prominently involved in off-farm enterprises and those reproductive activities which are commonly subsumed and hidden under the blanket terms 'housework' and 'childcare'.

Technological changes may have complex and differential effects on the men and women within a given society. Thus, it is essential during the initial planning stage to gain a systematic understanding of those factors which may be pertinent to the future implementation of a project. The information which was available on gender and intra-household variables on Madura at the time the project was introduced was scant. Over the years the need to involve women in the extension programme has been stated, as will be described below, but it was not until 1989 that a qualitative analysis of Madurese women in agriculture was conducted. This study (Casey, 1989) concluded that the involvement of rural women in the decision-making process concerning agricultural matters was being adversely affected by their virtual exclusion from the extension programme.

The aim of the paper is to emphasise the necessity of understanding how a given farming system operates, particularly the complex inter-relationships which exist between men and women before a development project is implemented. It also reviews issues in the design of relevant research initiatives to establish gender-related concerns which may influence the outcome and benefits of an irrigation project. It has to be appreciated that farmers and households are not homogeneous and that distinctions prevail between individuals in their access to and control of resources. In short, the economic, social and political disparities which exist in a given locale have to be identified from the inception of a project. Those findings then have to be incorporated into the design, implementation and appraisal of the project.

## 2. AGRICULTURAL DEVELOPMENT AND THE MADURA GROUNDWATER IRRIGATION PROJECT

Madura, which lies off the north-east coast of Java, is traditionally known within Indonesia for the proud character of its inhabitants, for its hot, dry climate and barren soils, and, more recently in the context of the tourist industry, for its bull races (*kerapan sapi*). The island is some 160 km long, up to 38 km wide, and covers an area of 4,382 square km. It is rugged and hilly but not mountainous, the highest point being 470 m above sea level. A limestone formation, 50 to 300 m thick, outcrops as prominent escarpments to the north and south. The limestone soils offered only marginal potential for agriculture in the past. However, the limestone formation holds the only real potential for groundwater abstraction for irrigation. To the north and south of the limestone ridge lie alluvial plains.

The climate is tropical, but Madura has a more pronounced dry season than neighbouring Java, with droughts lasting between four and six months. Dry Season I falls between April and July, whilst Dry Season II falls between August and November. The Wet Season falls between December and March. However, the length of the seasons may fluctuate from year to year and from one area of the island to another. Rainfall varies significantly between different parts of the island, generally increasing away from the coast and from east to west. Mean annual rainfall varies from 1250-1750 mm in the east, to 1750-2100 mm in the western inland area.

Madura belongs to the administrative provincial unit of East Java. The island is divided into districts; from west to east, Bangkalan, Sampang, Pamekasan and Sumenep, which constitute 4 of the 29 administrative districts (*kabupaten*) of the province. The population is over 2.7 million (1980 census); average population density is 557 persons per square km. The fairly low growth rate (1%) is partly explained by permanent and seasonal out-migration to Java and beyond.

The majority of the population is dependent on subsistence level agriculture, the size of the average land holding being 0.1-0.2 ha. A 1982 land-use survey pointed out that only 14.1% of all land in Madura was used for wet rice (*sawah*) cultivation, while the corresponding figure for the province of East Java was 28.5%. Agricultural output is generally low due to relatively infertile soils, lack of water and other inputs. The staple crops in the traditional subsistence systems are rainfed rice and maize. Tobacco production is important in the eastern districts of Sumenep and Pamekasan,

and there are a few industries, such as tiles, bricks and textiles, in the centrally located villages of Sumenep. Animal husbandry, fishing, and salt production are also important throughout the island. Compared to the rest of the province, Madura has a low level of education, literacy rate, per capita income and development.

The Regional Development Plan of East Java for the period 1979-1984 (Indonesia's Third Five-Year Plan) gave high priority to Madura. The Indonesian government, with the assistance of international agencies, directed its efforts to the development of the island. It is in the context of Madura's poverty and lack of resources that the Madura Groundwater Irrigation Project (MGIP) has been developed. The original aim of the project was to increase agricultural production, mainly of wet rice. Soils were classified according to their suitability for wet rice and results assumed to indicate a general suitability for irrigated development. This emphasis on rice production was in accordance with the policy aim of the Indonesian government to achieve national self-sufficiency in rice at that time.

One of the main changes envisaged as a result of groundwater development on Madura was the conversion of unirrigated land (*tegal*), previously supporting a rainfed cropping pattern of dry-land rice (*padi gogo rancah*) and/or maize, to land suitable for wet rice. The aim was to grow two irrigated wetland rice crops per year. Such a change in land use was expected to result in a very large increase in agricultural production and be one of the major benefits of groundwater development.

The project was implemented through the Indonesian Directorate General of Water Resources Development (DGWRD) by the Directorate of Irrigation II (DOI II). The executing agency within the DOI II is the Groundwater Development Sub-Directorate (PAT) which has Groundwater Development (P2AT) office at provincial level and in the actual areas of operation. As P2AT is a government agency, it has to work through the existing apparatus of civil administration, from district (*kabupaten*) to sub-district (*kecamatan*) to village (*desa*). The Madura project comes under the jurisdiction of the East Java Groundwater Development Project Executive Board in Surabaya (BP P2AT Jawa Timur), which oversees all the groundwater projects in the province.

Following reconnaissance studies and investigations from 1972 to determine the scope for development, the MGIP has been implemented in three Phases since 1979 (discussion of the history of the project as a whole may

be found in Casey 1991 and Smout 1986 and 1990, and in various annual reports). By the end of the project, some 4672 ha will be irrigable and 126 tubewells will have been constructed, mainly in the southern half of the island. Typically a tubewell serves a command area of between 20 and 45 ha. It has been one of the key aims of the extension programme to form and develop water users' associations (*Himpunan Petani Pemakai Air*, usually known by the acronym *HIPPA*), made up of the farmers (*petani anggota*) in the command area. Support is recognised to be essential in areas such as Madura, where farmers have little or no experience of irrigation. From amongst their number, and with the assistance of the village head (*klebun*), the farmers select a committee. This committee consists of a chairperson (*ketua HIPPA*), a treasurer (*bendahara*), tubewell operator, water bailiff (*ulu-ulu*) and a secretary (*sekretaris*). Each block is headed by an elected person known as *ketua kelompok*, whose responsibility it is to liaise between block members and the HIPPA officials. Charges for irrigated water are levied by the hour or by number of plants, and are payable to one or other of the HIPPA officials depending on village preference. It is the aim of the project to hand over the running of the wells to the individual HIPPA and the local government after two years of support (i.e. for costs of diesel and the operator's salary) from the project, although this has not always been possible.

Financial support has been provided from the ODA (for the services of the principal consultants), from the European Community (for the services of local consultants, technical assistance programmes, procurement of equipment and construction contracts), and also from the Government of Indonesia (GOI). Liaison is maintained with the EC and ODA mainly at Directorate General and Directorate level. Responsibility for the project was handed over from the EC delegation in Bangkok to the Delegation in Jakarta on 28 November 1986. The principal consultants were British while the local consultants were Indonesian.

### 3. THE SOCIOLOGICAL COMPONENT OF THE MGIP

Gender issues in agricultural development received increasing attention during the 1980s (see, for example, Dey 1982, Nelson 1981, and Poats, Schminck and Spring 1988). However, it has often proved difficult to incorporate a meaningful research input in the feasibility and design stages of project development. Although time is a major constraint, agreement of research priorities both within a social research team, and also between social and technical staff, is frequently a source of debate, and sometimes



serious controversy. This section reviews the methodology proposed for social research in the early stages of the MGIP.

The original proposals for social research in the MGIP suggested a three-month period to gauge farmer response. This proposal was subsequently modified after a pre-feasibility visit for work to cover selection of sites, water charges, extension, and to clarify the effect of land tenure, cropping patterns and institutions on farmer response. Under these modifications, a sociologist or anthropologist would undertake this work over a six-month period.

The sociology programme was established in April 1985 with the appointment of an expatriate Sociology Adviser (male) and two Indonesian sociologists (also male). The Adviser made three inputs during 1985-86, while the two local sociologists were in post for twelve months. One local sociologist then remained on the project for a six month period. Following further recommendations from the funding agency, the sociologists focused upon the planning and design of new tubewell irrigation systems on the island. Take-up of tubewell irrigation facilities had been poor, particularly in west Madura and it was in response to this problem that the new programme of village studies and meetings was developed.

The research procedure agreed for farmer participation in new systems was for a short social study of two to three days in each location. Data would be collected on village social structure, on the importance of kinship patterns and settlement units, and on the identification of influential groups and individuals. This study would be backed up by three consultative meetings in each village during the planning process at which the views of farmers would be sought. Before these meetings were set up, a visit would be made to each village head to explain the objectives of the project, and it would be the responsibility of the village head to invite 'relevant farmers' to the meetings. Officials at higher administrative levels - the district and sub-district - plus the Agricultural Service (*Dinas Pertanian*) would also be contacted.

The purpose of the first consultative meeting was to introduce the ideas and practices of tubewell irrigation to farmers (since it was a new phenomenon to Madura), to discuss the proposed timetable of development activities and provisions for land compensation, and to consult with the farmers about the extent and boundaries of the proposed command area. The focus of the second and third meetings was to discuss with farmers the alignment of

canals, the division into blocks, and the positioning of outlets. It was also the general aim to cover such issues as land ownership, sharecropping, marketing, migration, the attitudes of farmers to tubewell irrigation, and to discuss any special requests farmers might have.

In implementing these social studies and consultative meetings in the villages it was hoped that all parties and interests might be consulted from the beginning of tubewell development and that any social factors which ought to be incorporated into the design of irrigation systems would be identified. The village studies were to be the responsibility of the local sociologist alone while the consultative meetings were to be undertaken by the local sociologist and members of the P2AT staff. The Sociology Adviser was to be responsible for reviewing the results of the programme, dealing with any problems occurring after the installation of pumps, and for report writing. It was expected that the sociology team would cooperate with the Design, Water Management and Agriculture sections of the project.

The procedure of village social studies and consultative meetings had been instituted too late to be incorporated into the 1984-85 programme. It was used in an abbreviated form during the 1985-86 programme in those villages where some work had already been undertaken. The procedure was scheduled to be implemented in full in 1986-87 for the Phase 3 drilling programme. However, it seems that the village social studies were frequently not undertaken and the consultative meetings were in practice limited to two. Besides participating in the programme of site selection and evaluation, the sociologists were heavily involved in those areas where take-up of tubewell irrigation facilities had been poor. This involved the sociologists in the use of agricultural demonstration plots, videos and posters in an effort to increase farmer interest and involvement in new schemes, plus the physical rehabilitation of irrigation systems (i.e. lining tertiary canals, defining irrigation blocks, and so on).

The initial pre-feasibility visit had pointed out the need for an extension strategy which incorporated women. Whilst recognising that time constraints might make this difficult, it was suggested that a 'small supplementary study' might be considered for the future. However, the recommendations concerning the study of the impact of tubewell irrigation on women were not taken up.

The primary aim of the sociology programme, as stated in the MGIP annual report of 1986 (1986:154), was to ensure:

that all the parties and interests may be consulted ....  
avoiding the alienation or exclusion of some elements from tubewell development at an early stage.

However, it seems that the contribution of Madurese women to agricultural production was not considered a priority. The possibility that women might be farmers, farm labourers and farm managers, and as such should be incorporated into the procedure of meetings outlined above, was not taken on board. Given that considerable efforts were directed to encourage farmers to take up the irrigation facilities and to perceive the project as their responsibility rather than an external imposition, the failure to involve women was a double omission.

Subsequently, however, certain members of the project staff, increasingly came to feel that women were not sufficiently integrated into the development project. A brief survey of women in agriculture was undertaken by the local sociologist in October 1987 on the north coast of Bangkalan. The ensuing report raised many more questions than it answered. It was eventually agreed that a further study should be undertaken, focusing on women's roles in decision-making and production. A farming systems-style survey of an informal nature was conducted in 1989, with a focus on specific areas of technical interest. The latter included land ownership, production arrangements, women's roles in marketing produce, in seed selection, storage and purchase, and women's attitudes and decision-making influence in the adoption of cash-cropping and irrigation.

Four villages were selected for fieldwork. These villages spanned the island, from the drier eastern areas where tobacco is an important cash crop, to the wetter west, where migration is more prevalent and where efforts are being made to establish *polowijo* crops (in the Madurese context, foodcrops other than rice, i.e. maize, soya bean, melons, etc), as cash crops. A week was spent in each village conducting informal discussions with women. Efforts were directed to meeting women wherever they happened to be - transplanting rice seedlings, weeding tobacco plants, finding fodder for cattle, planting groundnuts, performing the myriad of tasks subsumed under the label 'housework', and so forth. The interviews were generally conducted in Madurese, largely because most women did not speak

Indonesian but also because it was the language they were most familiar with.

The study included women from different areas of each village, of different age groups, marital status, and with varying access to land and income-earning activities. It proved possible to focus on particular topics as and when they arose, which would have been difficult if we had been administering formal questionnaires. Such topics typically concerned issues of local interest; thus in one village discussions frequently centred around tobacco, while in another women were keen to talk about *polowijo* crops. In the west, male migration and the opportunities to earn additional, non-agricultural income proved popular topics of conversation, while animal husbandry was much discussed in the fourth village. Thus key topics were identified by the women themselves and subsequently explored within the specific context of each village study.

A problem encountered in all four villages was that of persuading men that we wished to talk with women. Wherever we went, men would appear, intent on telling us "what we really wanted to know". Men were keen that we should receive the "right" answers to our questions and obviously felt that their womenfolk might misinform us and that this would have dire consequences for the village as a whole. A satisfying discussion with a woman would often come to an abrupt end when a man appeared because the women seemed reluctant to talk freely with men present (although there were exceptions). We wanted to spend as much time as possible with women without alienating or antagonising men, since this might have unfortunate consequences for the women concerned and also for the future success of the extension programme. This meant that sometimes we had to exercise a great deal of patience, which, given the time constraints, was not always easy.

To sum up this section, it can be said that the sociological component of the MGIP was introduced rather late in the day. At the time the consultation procedure for new sites was drawn up, the planning and survey of many Phase 2 systems was already well advanced. The Sociology Adviser noted in 1986 that in many of the cases where consultation had not taken place, substantial revisions to the command area boundaries and to layout proved necessary. It may be the case that the contributions of technically trained team members - hydrogeologists, soil specialists, engineers and agriculturalists - are usually perceived to be more tangible than those of a sociologist. Once a budget has been drawn up and the inputs from various

specialists have been allocated, the working schedule is often difficult to re-arrange. In the case of the MGIP, as we have seen, sociological inputs were only introduced in 1985, six years after Phase 1 of the project commenced. The problems then facing the sociologists were considerable: trying to coordinate a procedure of meetings in abbreviated form in some villages, in full in new sites, revising command areas in other villages, in addition to participating in demonstration plots, the presentation of extension materials, and assisting other sections in work concerning irrigation charges, for example. They were hampered still further by staff shortages and time constraints. It was in this context that the issue of gender was effectively shunted to one side. The lesson to be learnt from the MGIP case is the need to incorporate a sociological element in the initial planning and early implementation of a project with adequate inputs for the work and an agreed set of work targets. The MGIP also reveals the importance of greater sensitivity to gender issues on the part of all team members, including the sociologists.

#### 4. THE MULTIPLE ROLES OF MADURESE WOMEN

The village case studies established that Madurese women make a central contribution to various stages of agricultural production. All the women interviewed named farming as their principal source of income. Farming in Madura is based around the *tanean*, a settlement unit which consists of one or more houses, kitchen(s), cattle sheds and a prayer house. It is a semi-autonomous unit, occupied by an extended family who are linked not only by kinship ties but also by bonds of economic and social inter-dependence and cooperation. According to Madurese custom (*adat*), men are perceived to be the head of the household while women are traditionally associated with cultivating the land, becoming wives and mothers, and holding the *tanean* together. This is reflected in the fact that a daughter may, in some areas, inherit twice as much as a son, because as a man the latter is free to leave the village and find work elsewhere. Land may be held in a variety of ways, sometimes simultaneously; it may be inherited, worked on a share-cropping basis, rented, or pawned. Of course, not all women have access to land, and some are employed as waged labourers.

Men usually prepare the land (i.e. ploughing, hoeing and harrowing the soil) for crop cultivation, while women are generally responsible for many of the ensuing activities. Whether it is rice, tobacco, maize, or other *polowijo* crops which are cultivated, the labour inputs for planting, sowing, transplanting, weeding and harvesting are supplied by women. Men may also assist in

weeding the tobacco crop and in carrying sheaves of rice from the fields. The application of fertilisers and insecticides may be undertaken by either sex. Further processing (drying, threshing and winnowing) is done by women. The tasks of storing grain for home consumption and as sowing seed for the following year, plus the marketing of surplus crops, fall to women.

Both men and women provide labour under the *gotong-royong* system, whereby family members and neighbours come together and work as a group on each person's land in rotation, with no wage involved. This is an important form of labour for many small farms since a large group of labourers may be assembled and the work completed in a short span of time. In the wetter west of the island, where animal husbandry is of greater importance, adults and children of both sexes are involved in the collection of fodder for stall-fed cattle.

Since both men and women within a household may own land, and given that women traditionally control household financial resources, decisions concerning agricultural production have traditionally been taken jointly. However, as will be discussed in the next section, this is changing. In their capacity as farm managers, individual women may be responsible for renting or sharecropping land, hiring waged labourers, providing food and drinks for labourers, paying their wages, arranging credit and so forth. In areas such as the west of Madura, where seasonal migration of males has been prominent, many women are used to being responsible for decisions concerning the family farm. Widows and divorcees take sole responsibility for decision-making.

A significant proportion of women in the village studies participated in other income-earning activities, in addition to the roles discussed above. These activities varied according to local topographical conditions and proximity to market centres, and included the trading of fish, fruit and other goods, making a variety of snacks, and working as masseuse and dressmakers.

Women are also household managers, responsible for the day-to-day running of the household, a fact which is directly related to the cultural association of women with food. Most women are involved in non-productive activities. It falls to women to prepare and cook food, obtain water for bathing and cooking, collect firewood for cooking, to care for children, keep the house and yard swept clean, and so forth. Women often cultivate kitchen gardens to supplement their household's diet.

## 5. THE IMPACT OF THE MGIP ON MADURESE WOMEN

The introduction of tubewells and the adoption of new farming technology has had a significant impact on traditional cropping patterns in Madura. With the availability of irrigation water it is now possible to grow three crops a year in many of the command areas. Tobacco has flourished as a cash crop in the drier east and has spread to central Madura, where there is now a greater diversity of cash crops, including tobacco, chilli, cucumber, shallot, water melon and soya bean. In west Madura, the cultivation of rice, groundnuts and maize, together with small amounts of mung bean, cow peas, sesame seed and sweet potato, is combined with animal husbandry.

These changes in agricultural practice have affected women in a number of ways. In the past, Madurese women learnt farming techniques and practices from their parents so that there was a smooth transition of skills and knowledge from one generation to the next. Women were intimately involved in the various stages of decision-making and production, and, since their menfolk were often absent from the village in search of work, they were directly responsible for all aspects of farming. The method of acquiring knowledge from first hand experience still exists, but it would seem that women are being denied access to the information needed to operate the new technology because they are not included in the extension programme. The institutionalisation of information - on the use of tubewell water, new strains and crops, credit arrangements, and so on - seems to have brought about a sharper differentiation of 'male' and 'female' spheres of activity and influence.

Women have traditionally been involved in small trading. The expansion of tobacco production in east and central Madura has meant that the dynamics of economic networks have changed from a range of local, personal contacts to a hierarchical structure which extends beyond the local and interlocal markets. Agents of the large cigarette companies from East Java often buy the tobacco crop whilst it is still in the field, thus cutting out the small trader altogether. Sometimes an individual will make arrangements to buy the tobacco crop of a number of villagers, and then sell to the agent. However, with the availability of irrigated water in central Madura there is now a greater diversity of *polowijo* crops such as chilli, cucumber, shallot, water melon and soya bean, coupled with proximity to the town of Pamekasan (the administrative capital of the island). Women have been able to establish themselves as petty traders in these crops.

Although the Indonesian government is keen to establish a comparable *polowijo* crop as a cash crop in the west of Madura, the failure to do so to date has meant that women have maintained and in some cases expanded their traditional trading roles. Intercropping is common in west Madura. Farmers commented that when rice is inter-cropped with the maize variety Ardjuna (a high yielding strain which the government is promoting), the rice crop is often poor because Ardjuna absorbs a lot of water. When Ardjuna is inter-cropped with groundnuts, the yield from the groundnut harvest is low because Ardjuna absorbs more nutrients from soil than the local variety of maize. Women are reluctant to give up planting maize because it is a staple food crop. On the other hand, they also wish to continue planting groundnuts because the latter is an important source of cash. Some women have attempted to solve the problem by intercropping the local variety of maize (which is a much smaller plant) with groundnuts in the main body of their plot of land, and planting small amounts of Ardjuna around the perimeter of the plot. The Ardjuna cobs are then sold whilst the local maize is stored. Many women farmers informed us that the seed from Ardjuna does not store well. Further, the taste is not liked. Maize is a staple foodstuff in Madura, traditionally eaten mixed with rice. The problems surrounding indigenous ideologies of food, and the risks involved in planting a new variety or new crop, are difficult to pin down. The presence in Madurese kitchens of *lumbung* and *jurung*, large containers used to store rice and maize respectively, are indicative of the value placed on storing agricultural produce for the forthcoming year.

Migration by men is still a feature of life in the western part of the island. Proximity to the port of Kamal and to East Java and the unsuitable climate for tobacco production means that many men still look to migration for their livelihood. In east and central Madura, however, it is no longer imperative for men to find work elsewhere since the growth of tobacco as a cash crop has opened up new opportunities for income-earning. In one of the villages studied, in central Madura, a number of men had given up their jobs as pedicab (*becak*) drivers, *sate* sellers and street hawkers (*kaki lima*), and become actively involved in the choice of new strains and crops, fertilisers and insecticides, methods of cultivation and in demonstration plots. Prior to the installation of the tubewell the previous year, their wives had been responsible for the various aspects of agricultural production.

The extension programme is inadvertently skewed in its approach to farmers. Services have been directed toward men, who have been identified as effective farm managers, and the knowledge which men acquire (or have



access to, since not all men fully understand the extension messages) does not seem to filter through to women easily. Women are at a distinct disadvantage because they do not have ready access to the knowledge on which to base their choices. For example, a number of women in the survey did not know very much about pesticides because their husbands took care of this aspect of production. Although women were observed applying pesticides in the field, when questioned they did not know the brand name, the costs involved, or the optimum amount to use. Other women informed us that they did not use pesticides because they were afraid of damaging the crop and of poisoning themselves and their livestock (the leaves from various crops are used as fodder). They preferred to let any infestation take its natural course. Yet others were reluctant to plant new crops because they had not received any advice on growing techniques and marketing. That women have continued to participate in the decision-making process, albeit on a diminished scale, is a measure of their tenacity and enthusiasm in picking up information despite being virtually ignored by the extension programme.

It has been noted above that the family unit has traditionally been an important source of mutual help and cooperation for its members. It is from within the cluster of *tanean* that an individual may seek interest-free loans to buy seed, draw labour under the *gotong-royong* system, and so forth. However, with the introduction of tubewell irrigation, the new crops and varieties of rice and maize require greater expenditure on chemical fertilisers and pesticides. Traditional kinship networks are no longer always adequate to provide the cash flow required. This has meant that in some villages small farmers (both male and female) have had to turn to wealthy individuals for loans to purchase seed, fertilisers, to pay water charges, and so forth.

These individuals may also be prominent in buying up quantities of agricultural produce from small farmers. This was illustrated well in one of the villages where haji who bought up a high percentage of the chilli crop (known locally as *lombok*) was nicknamed "*haji lombok*". Wealthy individuals may also be the proprietors of village shops (*kios*) which sell seed, fertiliser, pesticides, farming tools, and a variety of household items such as sugar, soap, oil, etc. The *kios* undoubtedly provide a convenient service, making it possible for small farmers to purchase inputs and goods on a credit basis. However, at the same time, small farmers are increasingly enmeshed in a patron-client relationship, becoming ever more dependent on a handful of individuals for inputs, credit and the marketing of produce. It

would be extremely difficult for small farmers to disentangle themselves from this situation.

It would appear, then, that the establishment of tubewell irrigation systems, together with the introduction of high-yielding rice and maize varieties, new cash crops, and the availability of fertilisers and insecticides, has altered the balance of power between men and women. By making men the target for extension messages (even in areas where they were absent from the village for long periods) they have been elevated above the *tanear* milieu in which they exist.

## 6. OBSTACLES TO WOMEN'S INVOLVEMENT

The extension services exist to disseminate technical assistance, to advise farmers on land preparation, on the availability of alternative crops and new seed varieties, the use of fertilisers and so forth. It is clear that the extension programme is missing a significant proportion of farmers because it is not reaching women farmers. Extension messages have been targeted at men. Why should this be so? It has been ascertained that women make a substantial contribution to agricultural production and that many of the new technologies being promoted are related to the tasks they traditionally perform. What are the barriers to women's participation in the extension programme?

One of the major obstacles in involving women in the extension programme is in making direct contact with women. Women are not generally represented in village level institutions. As a consequence of this isolation, women have had little opportunity to develop leadership skills. The village head (*klebun*) is always a man, and negotiations concerning the irrigation project within a village begin with him, as has been mentioned above. He is responsible for contacting farmers to discuss the proposed areas to be irrigated, on possible canal alignments and block boundaries. The *klebun* only invites men farmers to these meetings, even when women are landowners in the proposed command area. When data has been collected on farmers in the command areas, the names of male heads of households have been noted down rather than the names of landowners. These usually include men and women. Following on from the preliminary consultative meetings, it is men who are subsequently invited to form the HIPPA committee. In the four villages studied, there were no women officials on the HIPPA committee (chairperson, treasurer, water bailiff, secretary,

operator). The heads of the irrigation blocks (*ketua kelompok*) were also all men.

Invitations to meetings with Agricultural Field Assistants are usually also only extended to men. A considerable number of women farmers said they they had never met or spoken with an extension worker, either from P2AT or the Agriculture Service. In discussions with the Agriculture Field Assistant in one village it was apparent that he was aware of the gap in the extension service as regards women. However, he felt that he could not approach women farmers as a group. When developing and adapting the existing extension programme, the various cultural constraints which women face must be acknowledged.

Videos have been produced by P2AT (on tubewell agriculture and water users' associations) and shown in villages as part of the HIPPA training programme. Few women had seen these videos, despite the fact that in a rural area the showing of a video would be quite a social event (but see Smout, 1986:16). Women did not feel that they could simply turn up when they had not been invited. It seems that the only women who are at liberty to attend meetings are divorcees, widows, and those whose husbands are incapacitated. Even within this minority group, few actually attend because they feel uncomfortable attending what is, in effect, a gathering of men.

Although posters have been produced and displayed in the villages, the fact that many Madurese women are illiterate means that the extension messages may often go unheeded. Literacy in Madura has improved dramatically over the last two decades due to the increasing number of schools in rural areas. However, for financial and cultural reasons girls tend to cease attending school at an earlier age than boys, and consequently the illiteracy rate is higher among women. In addition, when posters are displayed at the pumphouse they frequently go unread, since access to the pumphouse is often restricted for safety and security reasons.

Thus, right from the beginning, women are excluded from the project. The reasons for this discrimination are partly associated with cultural norms; Madurese men and women rarely come together in groups outside the family. Further, given that women are often involved in multiple activities - both on and off-farm, as household managers and child carers - it is physically difficult for them to attend meetings which are held in the morning or evening. Ray (1990:25) has pointed out that a recent study has shown that many Madurese women of reproductive age are under-nourished

and energy deficient. Consequently, they may have to spend more time than is usual in nursing underweight sickly babies and have less energy to participate in activities beyond their normal working day. This problem might be tackled by arranging meetings at a time which fits in with women's work patterns and by encouraging participants to organise a creche during meetings.

Another reason is that the planners of the project did not advise the different levels of government organisation that concerted efforts should be made to incorporate women into the MGIP from the initial survey and planning stages onwards. One assumes that this occurred because the role of women in Madurese agriculture was not sufficiently understood. Consequently, the advantages of involving women, and the barriers which existed in the programme, were not appreciated.

The failure to integrate women into the MGIP may also be partially explained by the fact that research into women's roles and status has entered the development sphere rather late. This is changing. The ODA has recently published a Checklist for the Participation of Women in Development Projects which is being circulated to ODA and consultative staff. It is to be hoped that its use will help to avert the unwitting exclusion of women from future development projects.

In 1990 the ODA drew up terms of reference for an adviser to make a one-month input to the MGIP to consider the ways in which the agricultural extension strategy should be modified by integrating the needs of women into the project. It was recommended in the subsequent report (Ray, 1990) that a substantial Women In Development (WID) programme should be included in the proposed Phase 3 Extension to the MGIP. A one year extension had been sought largely because delays in equipment supply had put back the commissioning of 20 wells and, in turn, had delayed the associated training programmes. The extension was granted and commenced in November 1990. It included a six month input by an expatriate WID Adviser. The Adviser's brief was to establish a programme for the greater involvement of women in project activities, with particular attention being given to HIPPA activities and demonstration plots. The overall aim is to work alongside the Department of Agriculture, since when P2AT withdraws from the project all future extension work will be the responsibility of this Department.

## 7. CONCLUSION

The finding that Madurese women are active participants in many aspects of agricultural production, but have not generally been consulted in the planning or implementation of the MGIP, is predictable enough and not peculiar to Madura. During the past two decades many authors have documented similar situations in various parts of the world (see, for example, Dey 1982; Nelson 1981; Poats, Schmink and Spring 1988). In my report (1989) I concluded that the scope of the MGIP should be broadened to incorporate the roles of women in agricultural production and decision-making, since the extension programme would obviously be much more successful if directed toward both men and women. If men continue to be singled out as recipients of the extension services there will be a corresponding loss of socio-economic status for women. Suggestions were made on how the extension methods might be communicated to women as a group.

As a preliminary to implementing any measures aimed at involving women in the extension programme it would be useful to ascertain the numbers of men and women employed as Agricultural Field Assistants by the Agriculture Service. Efforts will have to be made to recruit more women staff, with priority being given to Madurese speakers, who may then be trained and deployed to work with rural women. Of course, hiring more women as project staff members will not guarantee success, since the gender of a researcher is no guarantee of the requisite analytical skills. However, women staff have a better understanding of the problems which women farmers face. As a corollary to this, men extension workers should receive some re-orientation training to make them more explicitly aware of the scope of women farmers' activities and problems. The Agriculture Service possesses the infra-structural capabilities of reaching village women and working with them, and efforts should be made to encourage administrative officials to put pressure on, and support, the Agriculture Service in mobilising its undoubted potential to maximum effect.

In the drive to increase contact with women farmers, women should be invited to special explanation meetings, they should be integrated wherever possible into the water users' associations (HIPPA), and women's farmer groups should be set up. If information is to travel beyond a small number of women, then contact groups must be set up with precise objectives. Efforts should be made to involve more women in demonstration plots, so that they may learn at first hand about new crops and strains, recommended

cropping patterns, inputs, water management and irrigation practices. Greater use should be made of extension materials. Since the majority of women in the survey did not appear to have seen the P2AT videos it would be helpful to show the videos in selected areas at times which suit women. Posters should have a greater impact if displayed at various points around the villages, and not just at pumphouses. A likely site would be rice mills, which are a popular congregation point for women. It was suggested that a poster be designed, specifically targeted at women, to emphasise the fact that tubewell irrigation is not the preserve of male farmers but is there for the benefit of the whole community.

Existing women's organisations might prove useful in making contact with women. Family welfare programmes (PKK) have focused on the centrality of women's roles within the family, on health care, on the preparation of food and so on. However, those who might benefit most from such programmes do not have the time to participate and often feel that the subject matter is irrelevant to their lives. If programmes were initiated which cover the other side of women's roles, i.e. their involvement in farming activities, it might be possible to involve more women. A woman speaker from the Agriculture Service or P2AT could, for instance, discuss the extension literature and posters (which would also help to bridge the problem of illiteracy). An example of what might be possible in the future is provided by the family planning programme; strong grass-root level organisations have developed as a consequence of the visits to PKK meetings by family planning specialists.

There are obviously different perceptions concerning the utility of tubewell irrigation. This is particularly apparent in the wetter west of Madura, where the effects of tubewell irrigation have been less dramatic than in the drier east. The original aim, that rainfed land (*tegal*) would be converted to irrigated land (*sawah*) so that two irrigated crops of rice would be grown each year, has not been fulfilled. It is now acknowledged that since much of this *tegal* land had already been developed for *polowijo* crops it is unlikely that conversion is either practicable or economic. The government has now prioritised the production of *polowijo* crops and is keen to find an alternative cash crop for the west, comparable to tobacco in the east. As part of this programme it has promoted new higher yielding varieties of maize which do not conform to villagers' requirements, as has been mentioned above. Farmers in the west of Madura tend to see irrigation water as a means of ensuring that they are self-sufficient in foodstuffs. Only when this basic need is satisfied will the possibility of cultivating cash crops

be explored. Many express a natural anxiety that if they switch to new crops or varieties they may face disaster if the crops fail. Though intercropping is traditional in the west, not much emphasis has been given to date to demonstrations of intercropping. Part of the answer would seem to lie in directing the extension programme to those who are directly involved in producing, storing, preparing, and marketing agricultural produce, - that is, women farmers.

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