WATER ALLOCATION: ATTITUDE, PERCEPTION, CONFLICTS AND ALTERNATIVES BETWEEN WATER USERS AND IRRIGATIONISTS
A CASE STUDY OF DAMNOEN SADUAK

AUNNOP ARIRAT

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Aunnop Arirat

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ABSTRACT

Damnoen Saduak is a very productive agricultural area which deserves the best possible water management. Irrigationists as providers have many duties such as controlling water levels to prevent contamination by seawater ensuring adequate water in times of shortage; and draining water from upper areas into the sea.
Performance of these duties, however, has sometimes brought them into conflict with water users who feel their interest, have not been adequately considered.

This field research study was undertaken to define and understand the views of, and the relationship between, water users and irrigationists. This research was also intended to provide a rationale for irrigationists' actions. The investigation focused on the attitudes, perceptions, conflicts and alternatives of water users and irrigationists or providers. It addressed such matters as the water allocation system, water quality and management and the extend to which water users and irrigationists are satisfied with the current management, of existing of water problems. Data were collected by questionnaires and in-depth interview.

Results revealed that there are some significant differences of perception and attitude between water users and irrigationists. Water users often perceive that providers manage water without regard to users' needs. Some water users believe that the water allocation system is inefficient and ineffective and that such problems are compounded by an inadequate budget and budgetry inefficiency. By contrast, irrigationists or providers believe that they provide the best service for water users despite many constraints and limitations.

These findings suggest that irrigation projects should allow water users to participate in every level of water management and also promote more information interchange between users and providers. Joining hands and participation between stakeholders is an essential strategy to improve water management, in the study area for maximum satisfaction.

KEY WORDS : WATER ALLOCATION / PERCEPTION / ATTITUDE / ALTERNATIVE
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การจัดสรรน้ำ: ทัศนคติ, การรับรู้, ความขัดแย้งและทางเลือกระหว่างผู้ใช้น้ำและเจ้าหน้าที่ชลประทาน. กรณีศึกษาพื้นที่อำเภอ ดำเนินสะดวก. (WATER ALLOCATION: ATTITUDE, PERCEPTION, CONFLICTS AND ALTERNATIVES BETWEEN WATER USERS AND IRRIGATIONISTS. A CASE STUDY OF DAMNOEN SADUAK.)

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บทคัดย่อ

การศึกษาครั้งนี้เป็นการวิจัยเชิงสำรวจเพื่อศึกษาความสัมพันธ์ของผู้ใช้น้ำและเจ้าหน้าที่กรมชลประทาน พื้นที่ทำการวิจัยคือ อำเภอดำเนินสะดวก จังหวัดราชบุรี ซึ่งอยู่ในความดูแลของโครงการส่งน้ำและบำรุงรักษาดำเนินสะดวก โดยได้เลือกปัจจัยที่จะศึกษาคือ ด้านการรับรู้ ทัศนคติ ผลกระทบและแนวทางการแก้ปัญหาระหว่างผู้ใช้น้ำจากโครงการและเจ้าหน้าที่ในโครงการส่งน้ำและบำรุงรักษาดำเนินสะดวก การศึกษาพิจารณาด้านระบบส่งน้ำ การจัดการลุ่มน้ำ คุณภาพน้ำและความเข้าใจต่อปัญหาด้านน้ำในพื้นที่ โดยใช้การเก็บข้อมูลด้วยแบบสอบถามและการสัมภาษณ์เชิงลึก

ผลการศึกษาพบว่ามีช่องว่างด้านความเข้าใจในตัวโครงการส่งน้ำและบำรุงรักษาดำเนินสะดวกระหว่างผู้ใช้น้ำและเจ้าหน้าที่ของโครงการ ผู้ใช้น้ำจากโครงการมีการรับรู้ว่าก่อนมีโครงการได้มีการจัดการเรื่องน้ำโดยไม่ได้คำนึงถึงความต้องการของผู้ใช้น้ำในพื้นที่เป็นหลัก ผู้ใช้น้ำบางส่วนมีทัศนคติทางลบต่อโครงการส่งน้ำและบำรุงรักษาดำเนินสะดวกเนื่องจากข้อจำกัดทางด้านงบประมาณ ในทางตรงกันข้าม เจ้าหน้าที่โครงการมีทัศนคติที่ดีต่อโครงการที่จะช่วยสร้างระบบการจัดสรรน้ำที่มีประสิทธิภาพต่อพื้นที่ดำเนินสะดวกในอนาคต ขณะที่มีการยอมรับถึงอุปสรรคและข้อจำกัดทางเทคโนโลยี งบประมาณและกำลังคน

จากการวิจัยครั้งนี้พบว่าโครงการชลประทานด้านการจัดสรรน้ำควรเปิดโอกาสให้ผู้ใช้น้ำหรือตัวแทนผู้ใช้น้ำที่อยู่ในพื้นที่ของโครงการได้มีส่วนร่วมในการจัดการน้ำและเพิ่มประสิทธิภาพทางด้านการประชาสัมพันธ์เพื่อสร้างความเข้าใจที่ถูกต้องต่อโครงการ อันจะทำให้เกิดการร่วมมือที่ดีระหว่างผู้ใช้น้ำและเจ้าหน้าที่ของโครงการในอนาคต

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CHAPTER 1
INTRODUCTION

1.1 Background Information

Water Allocation

Water is a common pool resource that plays as an essential element for all living organism. Today, it also serves the needs toward more economic such as industrial production, commercial process, energy generation, etc. The water scarcity more seriously appears due to the increasing of water demand. The conflicts often occur during drought period as water scarcity. The water resource management is a tool of human dominant the natural process for the highest benefit from water. In Thailand, the agricultural sectors are the main water users consuming a great deal of water in compared with other productive sectors in Thailand.

Thailand is an agriculture country in the Southeast Asia; water plays a significant role of essential natural resource for the nation. Presently, population, industrial and economic growth make confront of water rights among all stakeholders as well as the people who live in the city and countryside in the same river basin. During the dry season, there are competing users in the regions. In addition, the quality of water is being increasingly degraded by pollution (Flatters and Horbulyk, 1995).

The Chao Phraya Basin has been facing scared water, serving many users in the central region, including farmers, urban industries as well as the Electricity Generating Authority of Thailand (EGAT).

Diversions of water from Tha Chin and Mae Klong basins to the Chao Phraya basin have been used as a part of the solution.

Increasing demand throughout the basin has led to water shortage during the dry season, and this crisis requires a better water allocation among users in the whole basin (Flatters and Horbulyk, 1995).

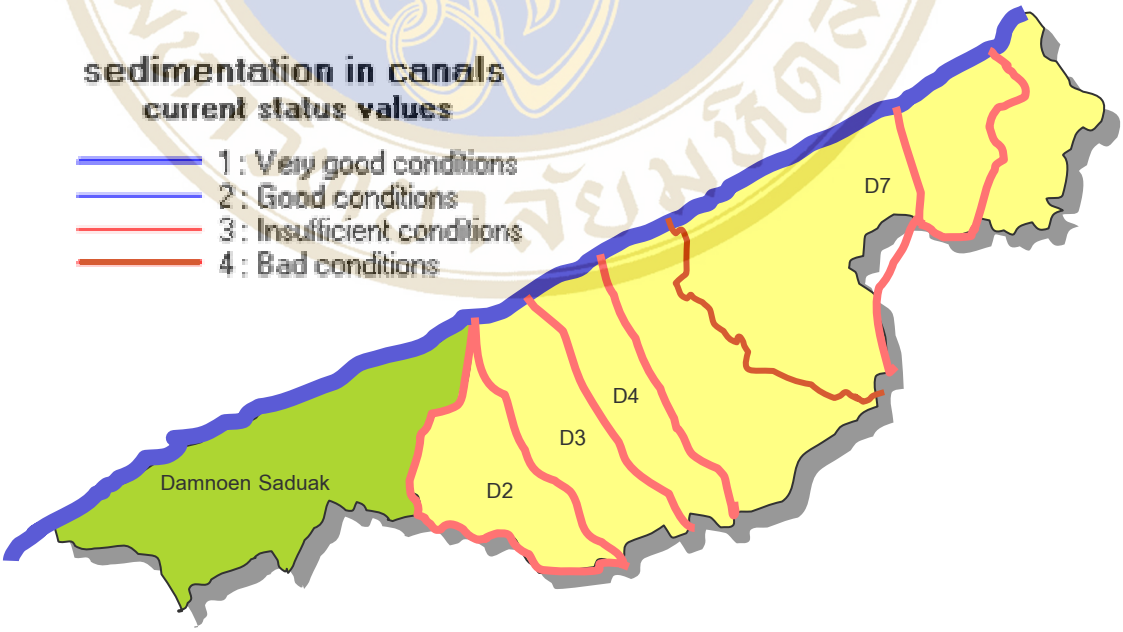
1.2 Statement of the problems

Water is one of the important natural resources for all living organism either directly or indirectly due to uncertainty properties of water that can change over time and can be predicted in each period. Sometimes it can be served at the right amount and time to the demand. On the other hand, it can be caused of flooding and water shortage. In Thailand, there were many flood disasters that gave severely affects to economy, social and population impacts; moreover, the loss figures of 10-year-period flood disasters had been raising 6,000 million baths to 40,000 million baths during 1990 to 2000 (Thongplew and Varawoot, 2003). It trended to occur continuously in the future because local people moved and resettled down both downtowns and riverside areas, which destroyed the natural balance such as forests, mountainside plains and streams. The average rainfall in overall country is 1,500 mm. per year could not get rid of drought in the dry season because there had never had good water resource management; the national institute of social and economic of Thailand expected in controlling flood disaster damages that would make the country economic reduce every year.

Nowadays, the basin developed planning in Thailand has not yet been done in the whole-systemic basin procedure or has not been planned basins helped one another; moreover, Thailand was still lacking of the transbasin-developed plan of the country that could be used as the identifying frameworks to develop the direction and certain period of the proceeding time of the country clearly. The proceeding acceleration in water resources plans in Thailand had been individually done by their own sectors. The results of unplanned corporations such as building small dams for irrigation

purposes upstream could make the downstream short of water, and they had conflicted in the water basin incorporations. Damnoen Saduak Irrigation Project is located between Mae Klong Basin and Tha Chin Basin; its lower area closed to the Thai Gulf has 252 km^3 (157,560 rais). Areas of The Mae Klong Basin is approximately 2.4 million rais (3,840 km3), it releases 1,200 m3 per second of water drainage that sometimes water from the upper basin is less than it used to be because people living around there spend a lot of water. Although water diverted from Mae Klong to Charakhe Sampan in Supanburi province and Tha Sang-Bang Pla in Nakornpratom province into Tha Chin has never stopped or never been in water shortage period, seawater intrusion in Tha Chin probably occurs if water quantity in these two canals is not much enough to push seawater in Tha Chin.

Tha Chin River, one of the river basins, has only 952 m^3 of the runoff average per person which was lower than The water quantity per a person of The International Standard which should be 1,000 m^3, so the Tha Chin River was in a water shortage stage, it used to be diverted into another river, though as well as accumulate sedimentation in Damneon Saduak (Figure 1).



(Source: Royal Irrigation Department, 2003)

Figure 1 Sedimentation in canals current status values of Damnoen Saduak Irrigation Project, Ratchaburi

As present situation, the efficient water resource management is becoming increasingly important to release the insufficient water availability in agricultural sector that needs more water than other activities. Water allocation is one of various kinds of water resource management, which has been widely using in order to give effect in subunits.

Confront of water users at Damnoen Saduak, Ratchaburi could be severed problem because of the conflict of interests among all stakeholders. Therefore, the appropriate solution on water allocation for Damnoen Saduak can be applied with the integrated method of attitude, perception, conflict and alternative for water allocation from both water users and irrigationists.

1.3 Conceptual Framework

This study focused on the factors relating to the appropriate conflict solution between irrigationists and water users in the sampling sites. The pursuing focuses on the relationship among perception, attitude, conflicts and alternative on the water allocation (Figure 1).

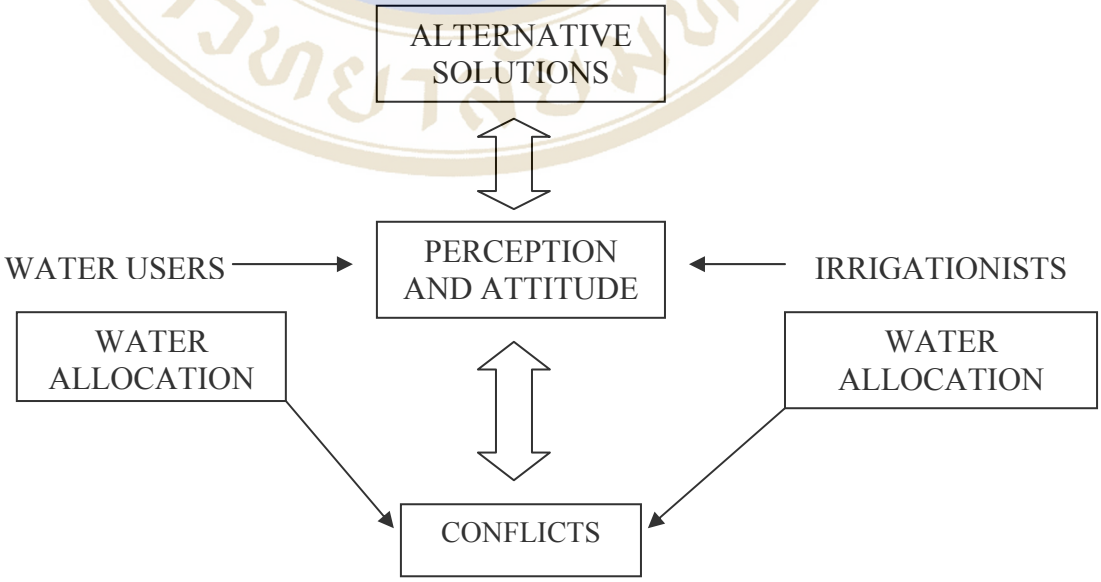


Figure 2: Flow chart showing the interactions among perception, attitude, conflicts and alternatives between irrigationists and water users.

1.4 Objectives of the study

This study will focus on the following objectives:

1) Undertake a qualitative survey to determine of the stakeholders among perception, attitude, conflicts and alternative on the water allocation at selected sites. The results could add to the existing justifications as an appropriate alternative of conflict management of water allocation, especially in Damnoen Saduak.

2) Undertake a study to determine the most efficiency solution on the conflicts of water allocation between the irrigationists of Royal Irrigation Department and farmers in Damnoen Saduak.

Research Questions

1) What are main factors to affect the potential of water allocation in terms of water users' perception in Damnoen Saduak?

2) What are the solutions about the water allocation in terms of water user's perception in Damnoen Saduak?

1.5 Scope of the study

This research will be conducted by interviewing the stakeholders on water allocation in Damnoen Saduak. Two main sites were chosen (Figure3). The Ban Ta Luang village was chosen because it represents the conflicts area about water allocation from upstream. The Ban Chaimongkol village was chosen because it represents the conflicts area about water allocation from downstream.

(Source: Adapted from Royal Irrigation Department, 2003)

Figure 3 Study areas in Damnoen Saduak Irrigation Project.

1.6 Expected Outcomes

The expected results from this study will be as follows:

1) Determination of the main factors effect of perception in water allocation between irrigationists and water users in Damnoen Saduak.

2) Provide support data for decision makers about appropriate strategies in water allocation project, especially, in Damnoen Saduak.

CHAPTER 2
LITERATURE REVIEW

These reviews will concentrate on what are the water allocation, what its advantages and disadvantages are, and how it important to the present human need and future. Water resource is a common pool for everybody; the increase of Thai's population also increases the consumption on natural resource that includes the water usage in terms of energy and direct usage. So it is important to pursuing the available water, water balance and consider with the potential irrigation system to satisfy and make equitable for all stakeholders. Some effects of water allocation are related to the sensation of human perception and attitude such as water right and available water in local watershed areas; this is often subjective and depends on individual perceptions. The levels of understanding will vibrate the conflicts of water usage. This study can help to make the water allocation more sustain and potential for Damnoen Saduak.

2.1 Water Allocation

Water Allocation is a study in principles for sharing of water between subunits of systems, farms, etc., and groups that influences the establishment of water allocation policies and the implementation of water distribution (Sittilert, 2003). Steenbergen F. Van (1992) defines that water allocation is the process used when deciding how much water should be set aside for the environment and how the remaining water should be shared between industrial, agricultural and public water supply areas. The real time irrigation water allocation problem was defined as one of "providing the best distribution of scarce water resources (Bhaktikul, 2001). The water allocation problem written is one of assuring the equitable distribution of irrigation water supplies within an irrigation system (Wardlaw and Bhaktikul, 2001), so water allocation and distribution of water in the irrigation system are some of the most important activities found in agriculture because they require an understanding of the

complex interactions between the physical, technical, socio-economical and organizational factors the uniquely affect each irrigation system (Sarwar, Bastiaanssen and Feddes, 2001).

The characteristics of indicates that sharing water is more complex than sharing other natural resources even fishery allocation systems may be more static and less complex than water allocation systems. Water allocation takes an important role as an assistant of planners, policy makers, administrators, and water resources professionals; it helps them in implementing efficient and effective water allocation systems. Water allocation is central to the management of water resources. At the beginning of ESCAP study on water and sustainable development has identified the need in order to establish suitable management and planning processes for the water sector which has yet remained legally acceptable in view of the rapid changes in the socio-economic development of the countries in this region but, unluckily, that need is absent in many countries (ESCAP, 1997).

The primary objectives of water allocation are to maximize the benefits which human society can get from the use of water, while at the same time preserving and protecting water resources and the environment. Water must be used within sustainable limits to protect its continuing quantities and quality. It should also be protected in other ways, for instance by ensuring that the quality of watershed land is maintained (UN, 2000).

Planning is an important part of water management and it applies to water allocation. Planning for the use of water resources is necessary for several reasons. Water should be managed on the basis of the hydrologic unit, which means the river basin or sub-basin-for surface water and the aquifer for groundwater. The ideal water allocation system covers all the water within each basin or aquifer system and is capable of assessing the cumulative impacts of water abstractions of the water resources as a whole. In reality, numerous administrative jurisdictional boundaries cross river basins and groundwater systems. Where the administrative units and jurisdictions are responsible for the use of disposal of water, special arrangements must be made to coordinate their decisions across the river basin (UN, 2000).

Water allocation is the sharing of water among users, which involves assigning rights and control of water to users, for uses, which are considered beneficial. Natural resources such as land, forest products and minerals are generally allocated to their users by identifying the area of land in which the resources are situated and recognizing the right of the user to exploit them within that area (UN, 2000).

Water allocation would not be a complex issue if the availability of water were unlimited. Water availability has appeared to be unlimited in some localities, although there have always been semi-arid and arid areas where it was clear that water was at a premium. Even in tropical climate zone, water may be an abundant at certain times. As soon as water becomes scarce, the completion for its use becomes critical (Sitilert, 2003).

In many countries, the scale of water use, compared with river flow and groundwater reserves, has been minor. Even so, water resources are unevenly spread and in some locations shortages have been occurring for a long time. During this century, economic and industrial development has seen a massive expansion of water demand in most countries, along with large-scale infrastructure for controlling and taking water for use. As a result, the pressure on water bodies has increased dramatically.

Keller et al. (1996) presented the Integrated Water Resources Management (IWRM) that considered the whole river basin area in order to use water more effective and efficient. This approach is corresponding to the common water management practices in Thailand at the present time. Since most of the large scale water resources systems are the multipurpose type, it needs to study the behavior of the system from the management and operation point of view such as product potential water uses (Molden, 1997) and the effect of water uses on various purposes in order to develop the alternatives for the decision makers.

Water allocation in aboard

Regional organizations in the U.S. are generally among states; they may be established for various purposes including long-term planning water allocation, broadly wide-purpose management or single-purpose management. Interstates compacts are under the joint authority of the Constitution and the 1911 Weeks Acts, two or more states can enter into an agreement on the interstate waters they share; this is called a compact. Water allocation compact is created to resolve some specific problem by detailed distribution of water under normal or stress situations (Black and Fisher, 2001).

Water allocation and national water policy in Thailand

Present water management in Thailand is scatter all over in 40 units of 9 ministries, until 2000 the minister of cabinet sign on the national resource policy for the specific stipulations such as the Asian Development Bank's loan for agricultural development project in Southeast Asia. Such stipulation assign the conditions is follows:

1) Water providing management
2) Water conservation in watershed areas
3) Integrated water planning system
4) Water tax
5) Water organization and public participation

Thailand has some obstacles on the water management at least 5 problems are follows:

1) Lack of unity in water management in terms of overlay duty, power and implementation.
2) Water is a common pool resource "it is free" for Thai culture that makes it almost impossible for the idea of water allocation.
3) Government policy emphasis to manage the water in a view of providing and development that it cause the lack of tool for the water policy in other view of allocation and demand management.

4) Lack of public participation among water user in the process of water management that cause the disintegrated solutions for conflict management in water allocation.
5) Lack of integrated data about watershed ecology and social economic so the previous policy influence for the new methods of water management that cause the disintegrated policy and create the hidden problems of the conflict of interests among irrigationists and water user(Sasisuwan and Puttani, 2003).

Up to now, water resource management in Thailand has been emphasized on providing adequate water for all users; for the dry season, increasing population and strenuous efforts in economy of people activities at the upper, central and lower part of The Chao Phraya River respectively need more water demands. This has been quite permanent scare water in the central part of Thailand; moreover, The Royal Irrigation Department always finds difficult to provide water and places kept it such as dams, reservoirs and weirs, etc. Problems in forestry ecosystem, environmental impacts, and social impacts are usually occurred after dams or reservoirs have been finished. So, The Royal Irrigation Department used to make a provision, it changes to make an allocation, instead (RID, 2004).

The solutions of conflicts in water resource are most intend to provide more coordinated so exist still in the aspects of organizing the stakeholder in administrative levels more than look into the grass root level (Netanyahu, 2001).

Damnoen Saduak water allocation project

In period of King Rama V, the water irrigation system started to establish in Damnoen Saduak. The introduced of new canal system between Tha Chin river in the Westside and Chaophraya river in East make this area be rich water body for promote military strategies and agriculture development. Many canals appeared at that time such as Klong Sunakhorn, Klong Sunpasamirt, Klong Mahasawat, Klong Prapimon, Klong Phrayabunler, and Klong Damnoen Saduak. Bangyang Regulator in Tha Chin River was constructed in the occasion of digging for sludge removing in Damnoen Saduak canal so the Bangnokkuak Regulator was opened for local traveling as the collected

tax system was introduced as they also call “Phasi chareon Damnoen Saduak Project”. In 1929, Royal Irrigation Department (RID) constructed Bangyang Regulator, Bangnokkuak Regulator, and Klong Preay Regulator as for the storage and distribution system. The emerging of new canal system cause the agriculture boom in Damnoen Saduak areas but only in the north side, in dry season the water scarcity make the south of Damnoen Saduak difficult to plant orchards as well as seawater penetrate from the klong Sunakhorn so RID have the idea of segregate freshwater and saltwater from each other. In 1961, RID construct small dam for salinity protection in Samut Songkhram include the control box in many points around Damnoen Saduak to make more efficiency of irrigation system between Tha Chin and Mae Klong river, which is cover about 348,000 rais and change the name to “Damnoen Saduak Irrigation Project”. The project locate at the south of Mae Klong Yai watershed, it’s landscape is average 400 m. from mean sea level in plain. The slope is less than 1% run from North to South, as well as from Klong Damnoen Saduak to coastal areas with natural canals makes the area suitable for agricultural activities. There are common 3 seasons in the project area that is summer, rainy, and winter. The average rainfall of Damnoen Saduak that is measured by RID within 13 years (1988 to 2000) is 1,167.53 mm/year. The land classification of Damnoen Saduak Irrigation Project can be classified into 7 categories as follows:

1) Tha Chin Series (Tc)

Tha Chin soil series can be found in on sea side basin with characteristics of improper water drainage. Because soil texture has many tiny holes, water can drain from soil texture rapidly. Soil surface of Tha Chin series are clay or clay combined with silica, brownish and having midst level of soil reaction. Deep low layer (30 cm. on wards) is clay or clay combined with silica, with color of grey or green-grey, having acidic rate from 7.5-8.5. Although, Tha Chin soil series are highly abundant soil, they can not used for agricultural purposed completely due to sea flooding. However, the prevention of such flooding is a plausible way in some areas for soil’s quality improvement in the long run as these areas will be provided for paddy field or coconut plants. As present, Tha Chin soil series are still left as mangrove forests, some are changed for aquaculture purposes and some are adapted to be salt farms.

2) Samut Prakarn soil series

Samut Prakarn soil series can be found on river basin due to sediment left from water flooding. These soil series are deep shallow clay with ineffective of water drainage. Surface layer is 20 cm. in depth as clay or silica clay. Dark grey or brownish grey or olive-green grey are color of the soil. Soil reaction is quite being base to middle level of base at level of 7.0-8.5. Shell could be found in deeper level 90 to 120 cm.

Samut Prakarn soil series have high quality for agricultural purposes. Laboratory evaluation shows that these soil series have full of beneficial organic matters as well as salty due to sea flooding event at least 2 times a year. Sea flooding prevention by preventing dam or sludge gate could be a way for soil quality improvement. Fertilizer addition is another way for soil enhancement.

2.1 Samut Prakan soil siries with very saline plase (sm-x)

These soil series could be found or sea side basin as sediment, outcome of sea flooding. With characteristic of improper of water drainage, these series can storage much of water. As different from Samut Prakarn soil series, sm-x has much more salinity. In summer season, salt curb could be found on surface. Upper soil texture is clay or silica clay color while the lower is grey or olive green grey at the level of 50 cm. deep from topsoil surface.

Because of these series are salt soils so they could not be provided for agricultural purposes. These soil series should be improved in quality as the other even though it is a hard task due to their strong salinity.

3) Bangkok Series (BK)

These series can be found in non flooded flat plain far from coastal area. Most area are flat and deep soil, bad drainage, high capacity of water storage. The soil's depth is about 25-30 cm. its characteristic is dark grey and dark brown with grey. Sometime has small brown spot with red or yellow texture. Soil reaction is little to medium acidic sometime as value is about 6.0-7.0. Lower soil depth usually starts from 30 cm. down as clay or silt clay. Its color is grey or green olive with grey and has some small

brown spot with red or yellow texture. Soil reaction is little to medium acidic sometime as value is about 7.0-7.5. There is Manganese and iron as dark spot scatter in its texture. It usually starts from 125-150 cm. down. Bangkok soil series is very high fertility for agriculture purposes, especially suitable for paddy field (first class) or orchards such as bean, corn, watermelon, etc. But may not suitable to some kinds of orchard that need well drainage soil types because it is very high capacity of water storage according to its materials. It is usually use for paddy field as yield can be high productivity.

Bangkok Series, Low phase (BK-Lo)

It can be found in flood plain areas in the West of Tha Chin River in lower level from Bangkok soil series. The difference is this series will have top soil in very dark grey color in the depth not more than 20 cm. It is also very high fertile and suitable for paddy field.

4) Damnoen Saduak Series (Dn)

Damnoen Saduak series is common found in plain areas. It is a very bad drainage as very high capacity of water storage. Most farmers will dig it up to do orchard or fruit farms as well as Thon Buri series but most Damnoen Saduak Series relate with Bang lane series. The series top soil has 20 cm. in depth, as clay or silt clay. It is dark grey or black as its reaction is little to medium base sometime as value is about 7.0-7.5. Lower soil is also clay or silt clay with light grey and green olive as also have some yellow brown spot or light brown- green olive. Soil reaction has value about 8.0. At the depth lower than 150 cm. Soil's color will be green grey and can found many shell mixed in texture as well as some in lower soil.

5) *Samutsongkarm soil series*

Samutsongkarm soil series as almost found in river side basin, it is in deeper layer from their surface. These series have high capacity on water storage; bad in water drainage. The soil surface is deep around 30-50 cm. Soil substance is brown or dark brown color clay. Soil reaction is base on 8.0. The depth 50 cm. from the surface is brown-gray or grey-green color clay. The depth 100 cm. from the surface is grey-

green color clay. Soil reaction is base about 8.5. Samutsongkarm soil series are always used for coconut palm planting. Although, these soil series are completely suitable for planting, they are still haring salinity, as they are the most suitable for coconut palm by companying with other plants. By the way, improvement in Samutsongkarm soil capacity will be beneficial for other plants.

6) Thon Buri soil series

These series are always found on river basin. Soil layer is so deep and high capacity on water storage. These soil series are almost used for vegetable planting and orchard. Soil surface has depth around 40-70 cm. as clay or sand clay with brown or brown-grey color. Soil reaction is mild to strong acid, on around 5.5-6.5. The ground layer is clay or sand clay with olive green color. Some are yellow-brown or brown-olive green color. Soil reaction is some point between mild base to strong base as around 8.0-8.5. Manganese is always found on ground layer.

Thonburi soil series is midst complete for cropping. Vegetable plants and orchard could be planted in these soil series. Anyway, there are some areas with these soil series are used for paddy field, Thonburi soil series always have a problem of salt-water flooding due to river water lower and recover with salt water in underground layer.

7) Bang Nam Prico Soi series

These soil series are always found on sea side basin as clay substance. Their color is very between grey to dark grey with yellow dot. Soil reaction is mild to strong acid with acid rate from 4.0-6.0. The ground layer is clay substance with brown-grey or brown-yellow due to sulfuric combination. Some of them are brown-red or red-yellow color. Soil reaction is mild acid to strong acid with rate from 4.0-6.0. We frequently find oxides of iron as strong substances in the layer depth around 150 cm.

Bang Nam Prico soil series are nearly suitable for cropping, especially for paddy fields. Because of these soil series are being acid substances so they can not provide high quality of nutrient for fields, then the productivity has still be low compared with other soil series.

Land use in Damnoen Saduak

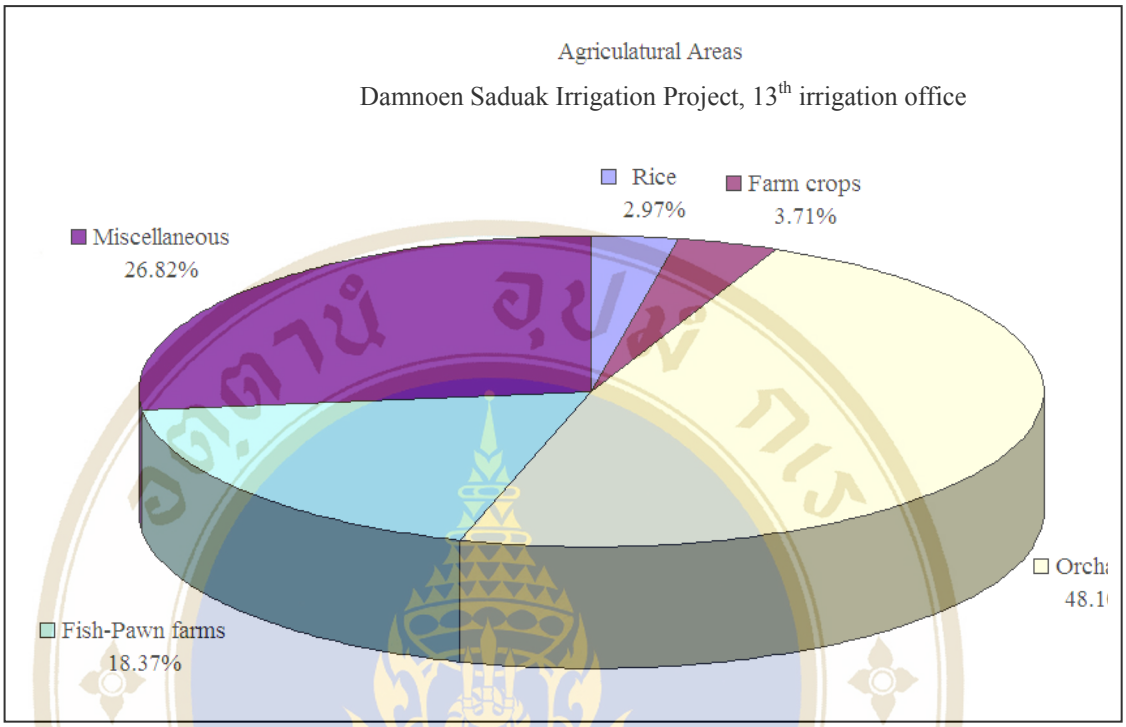
Almost land area of Damnoen Saduak irrigation project is agricultural areas, especially in Ban Piew District, Maung District, and Bang kon thee district in Samutsongkarm province. Land use in study areas can be classified by land usage as follows:

1. Orchard; The popular plants in study areas are covering coconut palm, guava, pomelo, grape, etc.
2. Aquaculture farms: land areas closely locate sea in Samutsongkarm province are always used for shrimp farms and fish ponds. Other nearby areas could be found a little of aquaculture farms.
3. First crop and second crop
4. Vegetable planting: lady finger bean and chili are popular plants of study areas.
5. Other areas: surrounding areas excluded with above farm lands are dominated as water storage site, build-up area and business areas.

Economic crops in Damnoen Saduak

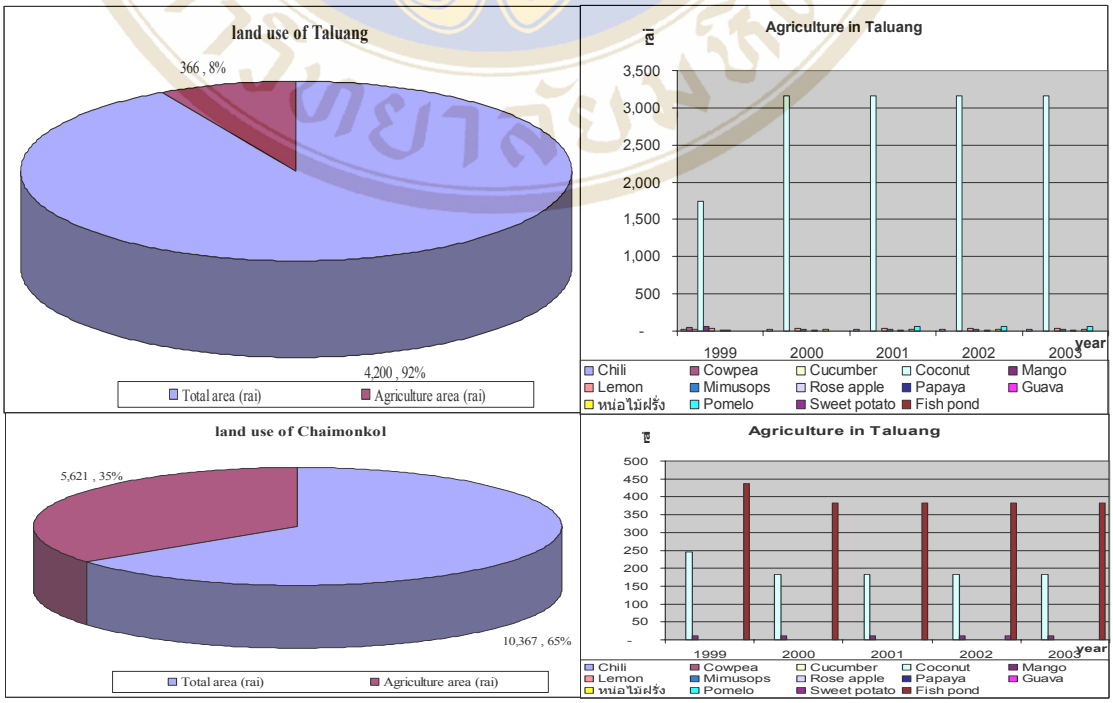
Because the study areas are land areas near sea side, the areas are always used for orchard and vegetable planning in the past. At present, farmers take advantages on living near seashore by changing their crops to fish ponds and shrimp farms (Figure 4 and 5). Economic crops in study areas are composed of:

1. Coconut
2. Chinese date
3. Mimusops
4. Pomelo
5. Papaya
6. Lady finger bean
7. Chili
8. Grape
9. Guava



(Source: 13th irrigation office, Damnoen Saduak Irrigation Project, 2003)

Figure 4 Show the agricultural areas in Damnoen Saduak



(Source: 13th irrigation office, Damnoen Saduak Irrigation Project, 2003)

Figure 5 Land use in Ban Ta Laung and Ban Chaimongkol, Damnoen Saduak

Population and household in Damnoen Saduak

Population in study areas are around 112,247 as meal persons are 56,555 and female around 60,532 under the households of 21,686. Population density is in urban area and it scattering in remote areas due to comfortable infrastructures.

Damnoen Saduak water allocation project is an irrigation project under the Royal Irrigation Department mainly aimed to storage and drain water for agricultural purposes as well as to prevent sea water intrusion to agricultural areas. At present, the project has 157,500 rai (252 sq.km.) included 126,000 rai of irrigation areas. The project covers Mae Klong and Tha Chin Rivers, in taking water from Mae Klong River. The project mainly serves orchards, fish ponds and shrimp farms, The water is storage as water stock in each drainage gates and farmers will take water into their farmlands by pumping through 3 irrigation canals fallows:

1) 11 L canal: gaining water from Takot-Damnoen Saduak main canal.
2) 1R to 9L canal: gaining water from Pahok-Buakwam Klong
3) 6R to 5L canal: gaining water from Kconkun Klong.

2.2 Water Policies

Even though issues concerning water resources management and water allocation policy and principles have been discussed at different national and international meetings, a big amount of published material and documentation of the principles and practices of water allocation is not readily available. So, the policy of water allocation should be engaged in the framework of national policies adopted by government; both policies of water resources and policies of concerned issues such as regional, industrial and economic development, health, sanitation and agriculture and others. There must also be a legal framework to enable water to be shared among recognized users and according to firmly-established priorities; moreover, a legal system of this nature has institutional requirements of a legal nature and a accepted procedures for determining new uses, for reviewing existing uses and, very importantly, for resolving disputes about access to water (United Nation, 2000).

Under the Asian Development Bank (ADB) loan, the Thai government, particularly its National Water Resource Office and the Department of Irrigation, has developed plans for water resource management and conservation of watershed areas. These include the rights to water-use, water allocation, water distribution, permission for water-use, cost for water supply and penalties for those who violate water use regulations; moreover, national measures and policies on water resources will establish river basin committees that will subcontract private corporations for construction of large, medium and small-scale irrigation projects, aimed at increasing production capacity of the agricultural sector in irrigated areas. Eight pilot projects will be started in large-scale irrigated areas. In small-scale irrigation areas, farmers groups, private organizations and non-government organizations will implement 50 water-use projects. In addition, measures for cost recovery have been initiated for irrigation systems with a process of consultation with all parties involved in water-use. In the conditional issues, The Thai government has finished The National Water Resources Policy on June 30, 2000; moreover, in developed plan, the government has to let people and private sectors participate in irrigating constructions and water resource management (Kaiyoorawong, 2000). However, after bargained with ADB in the loan condition, no specific time identifies when The Water Resource Act has been used; it is still being considered on processes.

Water Rights

The concept of rights is an essential factor in relationships among people, communities, society and government; moreover, rights of access to natural resources and environment are significant points of discussion in management. Generally, both other countries and Thailand accept two types of rights of access: state property and private property. Sociologists and anthropologists are beginning to be interested in studying the concepts of rights related to property because these ideas can solve general misunderstanding about property as a physical object that everyone can own. Owing to that thinking, property is seem only as a relationship between human and another, or others, by using rights to access things. Thus, having property means having rights and the person who rights must enforce them to receive advantages

along with the principle of social moral or laws. For this reason, sociologists and anthropologists use the concept of property rights in studying the basis of power relations between people with different abilities to access property which is not an object, but rather is a social relation that defines the property holder with respect to something of value against all others (Sittilert, 2003).

2.3 Perception of water allocation

Perception is a meaningful touch of feeling that was also translated into something known and understood; this would be used experienced events, knowledge and touch in stimulating nature to make it out clearly in that manner (Sariwatana, 2001). A meaning of perception (Noppaket, 1997) was the collecting processes, interpreted surrounding data thorough sensing organs; living things would feel responding and stimulating.

Perception was a process of a nerves' translation; generally, man always preferred translated meanings by feeling to translate meanings by real happenings, and this made each person in same situation be different perception (Peterson, 1992). Perception was measured in the interview question; the purpose of the interviews was to obtain from those engaged in practical agriculture their insights into the possibilities of enhanced irrigation efficiencies (Weatherford et al, 1982)

In Africa, the water allocation mostly means the distribution of equitable of water right and accessibility among water users. For Asia and the Pacific, Changes in perception of water allocation could be applied by the economic value of water usage that mostly related with water availability crisis. Most people realize that all fresh water is a scarce resource rather than an unlimited low-cost public commodity. The alternative of water allocation among water user's perception may be to inform the public on economic assessment of the real costs involved in providing potable water and treating wastewater (Swill Re, 2004).

Applying the real economic value of water, it currently is clearly underrated, may be a

dynamic driver in the efforts to avert a water availability crisis. The prerequisite for this change is for people to realize that all fresh water is a scarce resource rather than an unlimited low-cost public commodity. One plausible approach to raising awareness for the cost involved in delivering a previously cheap resource may be to inform the public on the economic assessment of the real costs involved in providing potable water and treating wastewater, outside the typical approach of using general revenue funds. Or to show, if the resource is not sustained it will be the alternative and how much will it cost to replace it.

Another way to safeguard water availability may be to promote a change in dietary patterns. Water demand is highly dependent on socially conditioned dietary behavior, and the choice of crops significantly affects agricultural irrigation requirements. The water quantities required for the meat-intensive diets typical of North America and certain parts of Europe are twice as high as those required for the less meat-intensive diets in Asia.

Measurement of Water irrigation perception

Water resource is a common as it for free to everybody so it's scarcity in term of management may make the question to person who is a user in some particular area. In the cases of conducting research on the perception on water allocation project that need to establish a sample tool to measure the water user's perception. Questions were asked regarding the water user's levels of efficiency and their needs or expectation. In this study, the perception will be measured by the qualitative questions as some follow guidelines (Weatherford et al., 1982):

1) How the water users (farmers) respond to the introduced project on water management?

2) What levels of perception on water allocation that water users can be recognize?

3) How do the water users think about the water allocation?

4) How much water do they need to satisfy their productivity?

These sampling questions will measure the perception of water user on the water allocation project to accompany with the analysis method for sustainable development on entire project.

2.4 Attitude of water allocation

Attitude is a word in Latin, APTUS that means “trend to incline” and “appropriate” (Allport, 1935)

Attitude is way of thinking and learning in order to answer both positive and negative response, situations, and institute including an identified person; it consists of intellectual, pleasure and practice (Aiken, 1994); moreover, it is mixed of belief and temper in positive and negative situations that people tend to make response to person, objectives (Coon, 1992).

Ivancerich and Matterson (1999) define that attitude that is important to response and show personal decision of behavior including an attempt influenced person, things and situation which attitude is a part of personality; perception and various kinds of motivations in environment (Ivancerich and Matterson, 1999).

Attitude was an index to point how people think and feel to objects or surroundings including circumstance; moreover, it has rooted in belief that could probably effect to future behavior. Attitude, therefore, was dimension of evaluation to show whether you like a case or not. This is a personnel communication in a person affected from perception (Peterson, 1978).

Katz and Scotland (1959: 402) quoted that attitude was compound with feeling of likes and dislikes; cognition and belief were explained by reaction between a person and a person, things, together with involved situations. State of mind readiness happened was up to experiences, and it would influence the direction of the reaction (Allport, 1935)

Owing to social and traditional states, they probably changed as usual, so attitude was flexible with them. The elements that resulted stability and variability were old backgrounds of those families.

Ages,

Level of education,

Social Status,

Wit and Genius,
Occupation details and
Geographic characteristic (Intrarawicha, 1981).

The way of initial thinking to let people take part in water natural resources was the establishment of the water user's organization that had continuously been done by The Royal Irrigating Department so far. But, unfortunately, they did not achieve any more because water users could not understand the benefits in the water users organizations they might get in the future; they felt that the Royal Irrigation Department made everything for them as usual, so they would not know the reason why they had to joint the organizations such as The Maeng Rai The Great Organization and The United Mae Rim Organization (Khao-SaAard, 2001).

Nowadays, people's attitude changes differently in various dimensions; pressure occurred from fighting for people's rights in communities makes them participate in perception of decision-making concerned big public projects. People should give their opinions that involve their livings and environmental impacts, for instance, jointing in developing of water natural resource, dams constructions and water pricing and then their attempt is finally protected under the constitutional laws (Khao-SaAard, 2001)

A person's attitude can be measured by asking questions about thoughts, feelings, and likely actions toward the attitude object. Attitudes can be measured by a quantitative technique i.e. each person's opinion can be represented by a numerical score. A particular test item, or other behavior indicating an attitude, has the same meaning for all respondents, so that a given response is scored identically for everyone making it. Attitudes are arranged along an evaluative continuum raging from favorable to unfavorable (Hogg & Vaughan, 1995). But these are some problems with attitude measurement like various definitions of attitude and lack of common methods of measurement.

Measurement of Water irrigation attitude

The local attitude of water allocation project need to establish a sample tool, as it can measure the water user's perception. Questions were asked regarding the water user's levels of efficiency and their needs or expectation. In this study, the attitude will be measured by the qualitative questions as some follow guidelines (Hogg & Vaughan, 1995):

1) A person's attitude can be measured by asking questions about thoughts, feelings, and likely actions toward the attitude object.

2) Attitudes can be measured by a quantitative technique i.e. each person's opinion can be represented by a numerical score.

3) A particular test item, or other behavior indicating an attitude, has the same meaning for all respondents, so that a given response is scored identically for everyone making it.

4) Typical attitude questionnaire respondents are asked to indicate whether they agree or disagree with each of a series of belief statements about an attitude object

5) Attitudes are arranged along an evaluative continuum raging from favorable to unfavorable

2.5 Conflicts of water allocation among water users

Conflicts

During the dry season, many important uses and regions had to compete even though water quality were being increasingly degraded by pollution, and water was no longer a "free" good in Thailand any more. "Water Conflicts" were discussed in term of economic perspectives; the allocation of scarce resources or the resolution of conflicts was the starting point of the economic. As the case of water illustrates, economic analysis had efficiency and equity implications, not only of patterns of resource use, but also of institutional mechanisms for resolving conflicts (Flatters and Horbulyk, 1995).

Inadequate use of economic instruments to regulate water use in Thailand had caused inequities and inefficiencies, and had resulted in significant economic a social losses.

Furthermore, the economic rented that arise from non-market allocation mechanisms will lead to escalating conflicts as water becomes increasing scarce. Competition for these rents would aggravate social conflicts and increase economic waste. It used to describe a serious crime, which involves violent; a legal term (Apinantara, 1980). Rapidly growing population, burgeoning cities, fast-paced industrialization, and advances in agricultural technology were now straining water resources, and building more infrastructures to increase supplies that spent a lot of money was solving the conflicts over water right (Roger, 1978).

Conflict management in water allocation

The aim here is to study rules for resolving disputes that might arise between submits of systems and between individuals and to examine groups that participate in setting disputes and enforcing sanctions.

Water allocation in Thailand, nowadays, is a system that is called "Open access regime". In case of river water, everyone can easily use in luxuriously in all activities. While water quantity is reducing, conflicts occur among water users in the river basin. The open accesses regime as it makes people use water without any rules or regulations. Problem in water conflicts arise 10 to 58 cases during 2533 to 2542 (Khao-SaAard, 2001). According to Alino crisis in 1998 causes water conflict; moreover, farmers in the higher land in Nan province growing litchi face water shortage. The upper areas cause the reduction of water. Mae Tang River Basin, especially, in the dry season, found that agricultural areas decreased from 100,000 rais in 1960 to 40,000 rais in 1990 that loss 26 to 93 million bath in economy.

Hafner, Schlarb and Pinili focus on natural resource and policy conflicts over the management of watersheds and water supply in metropolitan Cuba in the Philippines. As the city rapidly grows, managing its water supplies has emerged as an urgent issue. Conflicts have arisen over the city's attempt to control land use in three nearby watersheds. The case study explores the efforts of the Cuba Uniting for Sustainable Water Foundation [CUSW], Inc., and local civil society coalition seeking to address

this conflict through participatory planning by multiple stakeholders. Hafner J., Schlarb M., and Pinili L. 1995. Community-based natural resource conflict management: the case of watershed planning in Metre Cebu, the Philippines Cornell International Institute for Food, Agriculture and Development (CIIFAD) and the Cornell Center for the Environment Cornell University, Ithaca, New York, United States.

Mr. Pankhurst found that natural resource in conflict management processes during the past century in South Wello, Ethiopia. The study examines how local groups and external agents, including officials and landowners, managed conflicts over communal pasture, forests and water for irrigation. Local, informal dispute settlement for a still operates. However, state instability or changes in regimes, local populations reassert their priorities and challenge unpopular interventions. Overall, the outcomes of conflict management processes depend on the type of conflict and the power relations among stakeholders.

The conflict of water allocation appears in both sectors local level and government. The conflict of water management also occur between government sectors that cause difficulty in implementing the planning as some sector have the overlay duties in the same areas (Khao-SaAard, 2001). The demands of urbanization growth on water resource make the conflict of interest between local people and government projects. Therefore, the conflicts of water allocation commonly appear among economic sector, urban and rural areas as follows:

1) Present the decision making of water management is mostly involved with the stakeholder rights on who should be the first access to the water resource? Such as farmers, power plants or factories.
2) In 1992 the water scarcity crisis exist so government had announced to stop supply water from irrigation to farmers in dry season for the reserve the water to the urban areas as well as stop supply water to some commercial sector like massage business. At that time government use the ration method in water supply as timetable system that make the inequity among water user as person who have more economic power can storage water more than person who not.

3) The consequence of micro water management level in villages and macro level in government planning make the chaotic for the present water allocation as the inequity among water user that who have more power to access water resource will take most benefit much more than person who have no power on economic, technology and labor as also cause the problems of potential water allocation.
4) Most solutions of water management involved with the fighting and late technology management. Someone ask for the protection from local powerful man while someone asks for the protection from other government departments. These events cause the deny to the central government power for long period and make the obstacle to the local office operation and make some offices have no power in water management in real situation.

Even though, every Thai government intend to concentrate on the water management problems and try to find out the new paradigm in stead only use present "command and control" system but the problem in the government's sign is only the limited water storage system.

Main problems of water allocation are the lack of indicator for allocation for the most potential water irrigation that balances the equity, efficiency and conservation to society and environment.

2.6 Alternatives of water allocation for development

Farmer's respond is uncertainty and limit of irrigating water. In normal crisis, producers decide a process to get highest benefits depending upon the used, especially, limited natural resources. Under allocating water in the irrigation projects, we can separate the certainty of and limit of the irrigating water into three features.

First, water allocation for farmers' needs, they will choose crops that give highest outcomes compared with land use (Khadeedham, Srisanjar, Varamirt and Pititheraparb 1999). After 2539, Crowing crops rice on in the dry season both sides of the Chao Phraya River people grow rice twice in order to increase the product per limited area.

Second, Identified sorts of crops and water due to their needs. Farmers will do increase outcome with used more lands. Last, having limiting water and sharing water allocation, farmers are able to choose sorts of plants to grow but they take risk in scaring water. So, farmers will increase high outcome if used much water by selecting highest outcome plants compared with amount of water used. Planning in reducing water uses by growing flower plants in limited areas so as to saw water so, there is trade-off during saving water to situation of irrigation system which has been in 1992 to 1994; there are reducing plants areas and water to plants and changing plants (Khao-SaAard, 2001).

Water allocation in the dry season in each project, actually, the irrigationists can not control efficiently because farmers have strong confident water to their fields, they are out of project control through pumping, digging wells, need more extend. Therefore the alternative of water allocation in critical areas such as Damnoen Saduak irrigation project will deal with the problem of land use controlling and water balance in the flood plain area will be sensitive in terms of local perception and attitude to the central policy of water resource management.

Water users' organization

Water users' organization is a group of water users in irrigation projects that they have the same fundamental methods of water management, distribution, and maintenance of water irrigation system. The aim of this organization is to be criticizing the government's system on water irrigation system for better.

Water users' organization in Thailand can be classified into 4 categories as follows:

1) Northern water users' organization of Thailand as it is a biggest scale of organization who is involved with the matter of water irrigation system.
2) Water users' organization in form of small scale according to the Board of Water Resource Development of Thailand is assigned.
3) Water users' organization in form of small and medium scale according to Royal Irrigation Department of Thailand is assigned. This organization can

also classify as a group of water users, water administrative organization, and water user association.

4) Special water user's organization in special land allocation project for water pumping project of the Office of Electrical Generating.

Furthermore, the water users' organization can be considered by the category as follows:

1) Private organization is small and high potential for the amateur groups in the maintenance of small canal system.
2) Quasi-Public organization or water users' co-operative who is voluntary group and have their own regulation.
3) Public organization is a big water organization that is organized for multipurpose such as financial co-operative, tax colleting, public loan, etc. to develop and maintain their water resource system.

Prior the potential of water user organization was found to be a representative in the effect areas of government's water irrigation project but now some organization tries to develop their role of water stakeholder from only receivers to become an administrative level in the water allocation project (Sittilert, 2003). Irrigation organizations are not an end in themselves. To achieve objectives of financial and physical sustainability of the irrigation systems requires some form of collective action among the farmers. In this case, The local organizing for maintaining the minors and collective lobbying activities by farmers can help in terms of increase the potential of water distribution. Yet the latter is an important activity, especially in the context of co management, where coordination with government agencies is essential. Currently rests with the government. However, in over 60% of cases, farmers reported that they were undertaking some form of maintenance activities above the outlet (Table 1). Chambal was the only system in which less than half (four of 12) of the sites reported farmers working above the outlet, while 10 of 12 sites in KRS had a high degree of farmer maintenance. Clearing weeds and desilting were the most common forms of maintenance, although some other types or repairs may also be undertaken. Some villages have collective allow it to redeploy sta. to new activities, what accounts for whether or not farmers will be willing and capable of taking over the maintenance.

2.7 National Water Policy

The government has assigned the regulation for water resource management and transform to be the water resource management law for better potential management and implementation. The constructed law also assign empower of local authority as well as national administrative level for the equitability of water accessibility, efficiency water distribution, sustainable water irrigation. It also contains the statement of responsibility among stakeholders as the water users have to present their responsibility as well as irrigationists in terms of water access and maintenance. The essence of policy presents the vividness and direction on water resource management with the concept of water conservative. Educational of water management are applied in all levels of people as a tool to encourage the local awareness with the collaboration of research and public relation. The contained statements in policy emphasize the public and private organization to promote the self assessment on water management and participate in the first stage of any construction of water irrigation system

2.8 Water allocation at Damnoen Saduak irrigation project, Royal Irrigation Department

The main performances of Water allocation project in Damnoen Saduak are storage, controlling, distribution, drainage, and allocate water to encourage the agricultural activities. The other purposes of the project are energy generating, facilitate providing, and industrial support. It is also perform the disaster prevention from water in terms of transportation in the project's areas. The water allocation aspect is executed by water storage system in paddy fields with the in flow/out flow controlling by regulator. The controlling is continual operate from main canal to sub-canal and crop fields, from each other (Sirisophonwattana and Padungsuk, 2004).

The main purpose of RID will concentrate on the promotion of agriculture as follows:

1. Continuously constructed irrigation system as extension of previous projects such as the constructed reservoirs for flooding control and irrigating.
2. Providing the efficiency of quality control management in water irrigation system project.

3. According to 1 and 2, the better solution should be implementing and carefully investigate whenever the need is required with punctual consideration about the time frame and budget proposed.

Any irrigation projects are not only provide the solution involved with irrigated engineering which means about surveying, calculating of carrying capacity, master planning/constructed site, and maintenance but also mean the irrigated operating, flooding protection and storage. Some responsibility of irrigation should also involved with transportation facility and controlling for water quality balance (Sirisophonwattana and Padungsuk, 2004).

After the constructing of Pasak Jolasid Dam that the runoff can be reduce as the impact at Damnoen Saduak area also be managed. But there are still two main problems occur. First the reinforcement of seawater at the south and second the amount of rainfall that cover Nakorn Pathom, Nakorn Chum, and Left bank of Ratchaburi as 800 km^2 (500,000 rais). Therefore, Damnoen Saduak Irrigation Project needs to drain about 252 km^2 of water and outer areas as total 1,050 km^2. This event push the irrigation project in Damnoen Saduak provide the flood plain drainage system such as pumping equipment and regulator controlling on every rainy season (3 months) (Figure 6) (13^{th} Irrigation Office, 2004).

(Source: Royal Irrigation Department, 2003)

Figure 6 Water storage capacities in Damnoen Saduak areas

As we have same amount of water quality, population growth and increasing economic need more and more water and cause population rapidly right now. These make people strenuous effects to compete rare water one another, so water allocation is quite indeed in order to solve conflict problems.

The balance of water allocation between water for living and water for serving natural resources is a big challenge to people involved.

The Integrated Water Resource Management (IWRM) is used as the tool to handle with that balance because they rely on each other, and IWRM is now playing an important role in this task.

Integrations in natural systems are as follows.

- Between land use and water usage.
- Between surface water and groundwater.
- Between quantity and quality.
- Between upstream and downstream.
- Between surface water and seawater.

Integrations in human system management are as follows.

- Give important to water in economic system of the country.
- Cooperate between water usages' sectors.
- Joint hand in hand as the partnership between government sector and private sector.
- All sectors participation (The Office of National Water Resource Committee, 2002)

Integrated Water Resource Management (IWRM) changes water resource management in subunit usage to all units linked usages; if is a process that gives benefits and cause developed cooperation in water allocation, land and other natural resources concerned. It makes the best equity in society; it is by no mean affects to the sustainable ecology.

The need for an integrated approach is very significant in water resource management; just as technology, agencies, and markets alone generally fail to result in a high level of performance from irrigation systems, so one can not expect WUAs to achieve acceptable and sustainable level of system performance by themselves. Along with the institutional structure of WUAs, a combination of appropriate technology; supportive stage agencies and policies; and positive economic forces, including clear properly rights and profitability of irrigation enterprises, is required for sustainable water users' association, as well as for sustainable irrigation system (Rewtarkulpaiboon and Bhaktikul, 2004).

Asia's environmental crisis may be mainly a result of market and policy features, neglect and institutional weakness. Only a few countries in East Asia, including China, have succeeded in implementing policies to reverse the trend of continuing degradation. (UNEP, 2000).

CHAPTER 3
METHODOLOGY

This research is aim to investigate on the water allocation on what extent of they the perception and attitude between the irrigationists of Royal Irrigation Department and farmers in Damnoen Saduak and what are the alternatives to solve the conflict of interests on water allocation, especially, perception and attitude between the irrigationists of Royal Irrigation Department and farmers in Damnoen Saduak. To conduct this study, the methodology used the in-depth interviews techniques to pursuing the answers from all possible factors. The process is described as shown in Figure 2.

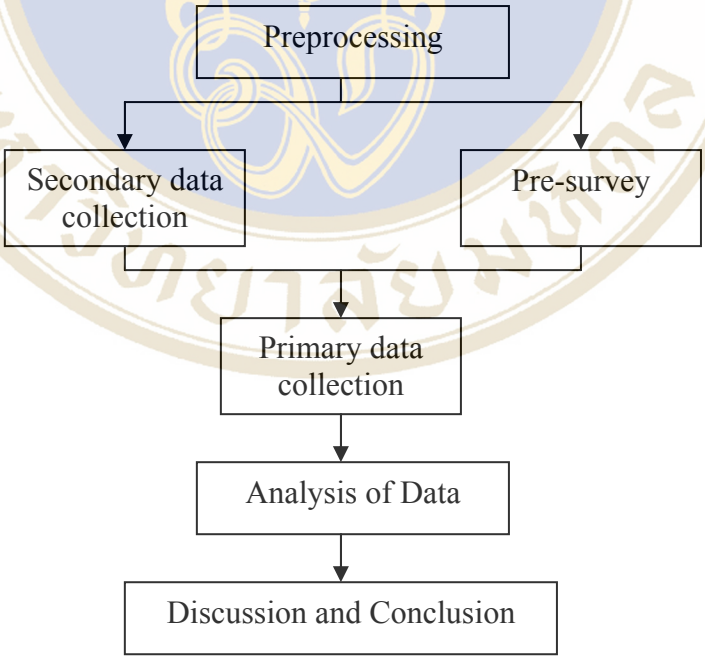


Figure 7: The process of conduct the research

3.1 Assumption

The assumption of the study will investigate the project of water allocation in the study area that will influence to the perception and attitude of all stakeholders if the negative appear in the both perception and attitude that will effect to the conflict and make obstacle to the water allocation. In the contrary, the perception and attitude of water users could be positive by providing appropriate alternative that will reduce the negative on the perception and attitude of the all stakeholders.

3.2 Description of the Study Area

Initially research sites are selected on the assumption that communities located 5 – 10 kilometers from the South of Damneon Saduak Canal. As such, two villages are selected that are Ban Khlong Khun Phithak and Ban Ta Luang as well as sever problems occurred due to the irrigation project in Mae Klong River.

The criteria for selecting study areas are.

1. The areas receiving water from irrigation projects for using in cropping.
2. The areas that have struggle from the water allocation process such as water scarcity during drought period.
3. The areas that water is used for multi purpose as well as has problem from the salinity

3.3 Data collection methods

One of the aims of this research is to investigate the perception, attitude, conflicts, and alternatives between irrigationists of Royal Irrigation Department and water users, especially farmers in Damnoen Saduak, Ratchaburi. Qualitative methods to get data, therefore, is used for conducting the field study, and consisted of three main steps: 1) secondary data collection 2) observation and 3) in-depth interviews. Those information then will be analyzed and concluded for the local community's

perceptions, attitude, conflicts and alternatives on water allocation in Damnoen Saduak, Ratchaburi.

Sampling size of population

The research will conduct two groups of sampling size as below.

1. Government officers and irrigationists of royal irrigation department in Damnoen Saduak, Ratchaburi.
2. Water users in Damnoen Saduak, Ratchaburi.

In this study data is divided into two collections.

3.2.1 Pre-data collection is the data collection before the field sampling survey start. This includes theoretical concepts and research papers relate to the water allocation's problems and solutions.

3.2.2 Data collection in the study area.

- The data collection has conduct on the surveying about the community lifestyle, characteristic of water users, water reception, water usage behavior and traditional of water management.
- In-depth interviews is using for both formal and informal techniques.

Questionnaires are used as a tool for main information gaining while group conversation technique is used for informal ideas, perception and relevant attitude of the stakeholders.

Questions are diversified owing to characteristics of respondents as follows:

1. Water users as farmers and fishermen from Ban Taluang and Ban Chai Mongkol.

1.1 Types of crops and crops changing each year

1.2 Land holders

1.3 Size of cultivated areas

1.4 Frequency of cropping each year

1.5 Income from cropping each year

1.6 Problems and obstacles in water allocation

1.7 Principles and methods in water allocation for cropping

1.8 Water usage planning

1.9 Adequate and frequency of irrigation water reception

1.10 In case of water scarcity, how to request water from the project

1.11 How to solve the conflict over water using in cultivation

1.12 Recommendation

2. Irrigation officers at Damnoen Saduak.

2.1 History of Damnoen Saduak water allocation project

2.2 RID policies in water management

2.3 Water quantity stored each year

2.4 Areas of responsible

2.5 Principles and methods of water allocation management in various activities and agriculture

2.6 Monitoring of water allocation

2.7 Problems and obstacles in water allocation

2.8 Recommendation

Selection of key informants: Target (Villagers)

Thirty peoples are selected as key informants and representatives of those two villages. Fifteen farmers are interviewed at each village. The following criteria are used for key informant selection.

- Key Informants should be able to provide in-depth information about historical water usage, timetable of water allocation period, crop yield, in Damnoen Saduak.
- Key informants should be persons that are directly affected by the water allocation in Damnoen Saduak, Ratchaburi.
- Key informants may be the community's leaders or the key persons involved with decision making.
- Key Informants may be local government officers such as Aor Bor Tor, (Sub-District Committee.) or municipal members.
- Key Informants may work for non-governmental organization (NGOs) or other organizations associated with the problems of water allocation.

Implementation of in-depth interview

The interviewing is scheduled for 2 days with half day spent at each village, and interviews each case for 20 - 30 minutes.

Table 1 Timetable for information gathering

Date / Time	*Group*	*Member (person)*	*Village*
1st day / half day	1st	10	RID, Damnoen Saduak
1st day / half day	2nd	18	Ban Ta Luang
2nd day / half day	3rd	13	Ban Chai Mongkol

Information Gathering

1. **Secondary Data Collection:** from various sources of information such as the research documents relevant with the topic, concerned information from the Royal Irrigation Department, The State of the Environment 2001, International View of Water Resource and its allocation, and others.
2. **Observation:** this method is used by observing objects in the environment such as vegetation, pond and household items as well as other attitudes toward water usage, conflicts of stakeholders and their ideas for solving problems. This method can be use for cross checking information in order to increase accuracy of data.
3. **In-depth Interviews:** key informants are selected as criteria mentioned above.

Equipment

Digital cameras, tape recorders and noted books.

Guidelines of Key Informant Interviews

1. Personal Data
2. General Data e.g. Occupation
3. Land holding

4. Water usage
5. Perception on water allocation
6. Attitude on water allocation
7. Recommendation on water allocation
8. If the problems continue, what they will do e.g. complain through their leaders in order to convey the message to the RID.
9. If the problems become more serious and RID can not solve, what will they do e.g. organize a group to protest or inform their problems to public.

3.4 Analysis of Data

Typological analysis is used to analyze information such as by chronology sorting, information gathered from in-depth interviews and secondary data analysis, and then describing these results align with the conceptual framework. Considering on objective of production assessed all data, land holders, efficiency of crop yield to see the similarities and differences. The pattern of water management can provided the understanding water allocation management, socio-economic structure as a driving force of the water management, ideas of conflict on water rights, etc.

CHAPTER 4
RESULTS

This study intends to investigate relationship among perception and attitude that might cause the conflicts between local people and the water allocation project of Royal Irrigation Department, Damnoen Saduak. People's sense on perception and attitude should be considered as a part of the primary data collection. The secondary data was used for describing the fundamental data and concepts of water allocation policy and management of the Royal Irrigation Department, Damnoen Saduak Project. The conflicts and alternatives obtained fundamental framework for analysis by observation of researcher and answer of the stakeholders. This chapter will describe step by step started from secondary data as fundamental framework. Questionnaires in field survey were used for gaining concerned primary data. Two parts of data collecting will be delineated as follows:

Damneon Saduak locates on 104,513 rais of irrigated boundary with the authorized in 3 projected as follows:

1. Nakorn Chum Project is the project that responsible for the irrigation of Sri Surat district, Prasartsit district, and Donpai district that are cover 7,622 rais or about 7.29% of all area.
2. Ratchaburi Project left bank is the project that responsible for the irrigation of Srimern district, Thapat district, Donkrui district, Pangpauy district, Donkrang district, Boungarm district, and Banrai district that are covers 75,193 rais or about 71.95% of all area.
3. Operating and Maintenance Damneon Saduak project that responsible for the irrigation of Srisurat district, Taluang district, Damneon Saduak district, Prasartsit district, Kunphitak district, and some parts of Donpai district that are cover 21,698 rais or about 20.76% of all area.

Nakorn Chum and Left Ratchaburi project are irrigating water from Northern of Damneon Saduak. Damneon Saduak irrigation project is the water storage from flood plain with 14 retention walls as they locate in Thonglarng canal, Taluang district is 4 places and in Klongmeng canal, Kunphitak district is 10 places with the purpose of seawater prevention to agricultural areas in the Southern of Damneon Saduak (Songsuntornvong, 1996).

The report of Damneon Saduak Agricultural Office classifies the project's responsibility as follows:

1. Natural channels in Damneon Saduak can be found about 200 canals that can provide potential irrigated system in these areas with the increased opportunity on drainage to nearby river in rainy period that make Damneon Saduak safe from flooding.
2. Underground water is mostly found in the gap of river or sea sediment. It consists of gravel, sand, and clay in form of alternate layer in 50-70 cm. under surface. This type of water has flow rate about 50 m3 per hour with good quality, except in the depth of 100 m. the salt quality will occurred with high proportion of iron. This type of water can be pumped for facility and agricultural purposed.
3. Rainfall is usually start from March-November, maximum rainfall will occur between September to October about 285.7-550.8 mm. However there is no rainfall between December and January.

The joints of Damneon Saduak canal at Mae Klong River is Bang Nokkake regulator and joints at Tha Chin River is Bangyang regulator. At Damneon Saduak's south have some retention walls to protect saltwater penetrate to the north areas. All runoff will flow to both rivers except the Southwest canals will directly flush to the sea. This can explain the whole water system in this area as water will naturally flush from north to south from Mae Klong River to Tha Chin River as slope presented. These flush will remain into canal system of Damneon Saduak in form of network. In rainy, water drainage will flow to both regulators in the end of Damneon Saduak canal and 7 remain regulators of irrigated canal D1 to D7 at the south before discharged to the sea. In summer, all regulator will close to store fresh water, as the water level in both rivers

may lower that can not flow to the Damneon Saduak canal. Water rising or setting have mean average between 1 to 2 times a day. The drainage will start whenever the time of water in the inner irrigated canals have high level more than rivers in contrary the influx will start when water in river have higher level than the inner canals. We found the low water level period in Damneon Saduak normally appear in November and December, and the high water level period appear in the mid of May with the highest point in August. The average highest level will present in October about +1.80 m. or +2.00 m. which will cause flooding in the Damneon Saduak areas (Suthi, 1998).

Interviewing the officers of Royal Irrigation Department, at Damnoen Saduak, it was found that water aspects can be divided into 3 main categories

1. Runoff
2. Flash flood
3. Rainfall

1. In Damneon Saduak area, most runoff come from Mae Klong River from the Western of Ratchaburi. The volume of runoff is about 1,000,000 m^3 a day that can be storage to the irrigation system as 200,000 m^3 per day. The secondary data from the irrigationists of RID show that the main problems of runoff in Damneon Saduak are discharged from Nakorn Chum district in Nakorn Pathom province and they have difficulty to manage the system because there is only one regulator to control discharged from Pohak-Baungan canal so the previous solutions of runoff in Damneon Saduak is construct the new regulators at Taplung and Keunkan canals from northern of Damneon Saduak as recommended from the irrigationists of RID.
2. Flush water in Damneon Saduak area has no record but it usually occur in the period of rainy due to the peak of water runoff.
3. Rainfall in Damneon Saduak is about 1,550 mm. per year that can be storage to the irrigation system as 800,000 m^3 per year (include runoff).

Primary data from water users was collected by in-depth interview at the end of May 2003 in Ta Luang, Damnoen Saduak and in Chai Mongkol, Ban Prawl. There are 10 irrigationists from the water allocation project of Damnoen Saduak canal were

interviewed by the in-depth in the half of day. The questions were provided starting from asking the basic information of the project i.e. project establishment, purposes, workforce, project boundary and responsibility. The question about their perception and attitude toward both of RID policy and local people action were gained by questionnaires and observation technique was used as a tool for gaining non-verbal reaction of the stakeholders to the questions.

Data from farmers was gained by using questionnaires. Thirty-four farmers are representatives in terms of local people user's view. Two parts of data, one from irrigationists and another from local people, were already combined to be the stakeholder's view and described by four categories as perception, attitude, conflict and alternatives for Damneon Saduak's water allocation as follows:

The questionnaires composed of three aspects served three mainly specific objectives of the study. The first aspect is asked about personal data of interviewees and irrigationists in study areas. Question for attitude toward water allocation project as well as its problems was secondly asked for gaining about thoughts and feeling of local people. Attitude as pleasant and unpleasant was gained thought questionnaires also. Feeling of favorite and unflavored toward allocated water is measured by some questions in questionnaires. Lastly, perception of interviewees to irrigation project and the way the project has done is gained by some open-end questions.

Results from the study will be presented into two parts

1) Personal information
2) Perception and attitude toward water allocation in Damneon Saduak Irrigation Project.

Part 1: Personal information

Questionnaires are distributed into two villages which are study areas; Taluang and Chaimongkol villages. Almost of interviewees are male (37 persons), only 6 persons are female. 23 from 43 persons are age 51 years old or more, 7 persons are age between 41-50 years and 13 persons are age between 30-40 years. Highest proportion of interviewees was graduated in primary school level (between classes 4-6) as 28

persons. 7 persons graduate between classes 7-9, 4 persons graduate between classes 10-12 and none is graduated in undergraduate level.

In terms of marriage status, most of them or 36 from 41 persons are marriage. 4 persons are single and only one is in divorced status. Asking about land acquisition, most of them (39 from 46) are land owners, only 4 are land rendered and only 3 persons are habitants. Farmer is popular occupation in the study areas as 37 persons from 41 are being in. 4 persons are business men as shop house owner. 34 from 42 persons have monopoly documentary only 8 of them survived in no-privileged land.

For economic status analysis, almost all of households have refrigerator, radio, television and motorcycles. 33 interviewees have refrigerator, 32 among them also have radio. Motorcycles are used widely with 27 interviewees having them. 31 interviewees have televisions as well as 16 of them also have motorcycles. Interesting data show that 12 persons have pickups and only one has a car.

In terms of occupation 22 interviewees are farmers and 16 persons left are gardeners and fishermen 5 interviewees are shop house owners. 18 fishermen provided mainly of economic fish, only 2 provide fishes for recreation purposes. 29 from 38 farmers have agricultural lands in downstream areas of irrigation project while 4 among them are on upstream and the other three on middle stream.

Part 2: Overall perception and attitude toward water allocation in Damneon Saduak irrigation project.

1) Water users view

Perception:

In terms of perception to water allocation policy of the project has been divided into two categories. First is perception of local users to irrigationists and second, the irrigationists to local users. In the first category, interviewees mention that in their communities almost all of local people always break out the rules of common benefits and try to ask only for their own advantages. Some of them avoid joining hands to

maintain common canal. Almost all of them mention that they have rarely received beneficial information from irrigationists from mass media such as local newspaper, radio, etc. Most of them feel that irrigation project is not much workable to meet the local people's needs.

Attitude:

Interviewees mostly mention that the irrigation project has directly affected to agricultural land areas and fishery activities as well as to water way in transportation. Although the interviewees accept that the irrigation project have provided machine and other material for solving problems in the study areas, some of them have still been unsolvable. In terms of attitude toward management policy of the irrigation project, interviewees think that they accept a few advised in irrigation management aspects also believe that the project's budget is not suitable for providing good plan for local people's need. Approximate half of interviewees think that they gain water allocated unequally as well as they do not be satisfied in terms of water volume. In interviewee's point of view, they mention that irrigationists do always ignore other of water's problems in study areas. They also mention that cooperative plan and water management policy have to be created joining hands on drawing and managing by all stakeholders

2) Irrigationists view

Perception:

According to perception meaning, Peterson (1992) said man normally preferred translated meanings by feeling to translate meaning by real happening and this made each person in same situation be different perception. This definition can be applied to analyze the irrigationists view through perception in the same above aspect. Because Damnoen Saduak irrigation project has to serve various activities of people in Damnoen Saduak such as pushing seawater, agriculture, reducing polluted wastewater and flood control while limited volumetric water which is released into canals gravity is quite important in connecting canals especially in dry season. Polluted waste, chemical fertilizers can make severe damage to water quality if people in the upper Damnoen Saduak discharge into canal when the seawater level is higher than water level in connecting canals. Water allocation cannot get rid of contaminated wastewater

but it can make it better by dilution. Although, irrigationists have continually provided plans for both improving and protecting water quality, the budget and manpower constraint influence some projects have not been implemented and some have been taken long duration. While the water problems in study areas have remarkably increased in complicated, water users do not understand exactly about all constraints. So they would percept that the irrigationists have unwilling and unwitting to deal with the problems. At the same time, irrigationists usually think that water users would understand the limitation of local RID authority such as budget or manpower constraint. Difference in experiences and education level between two stakeholders might be a main reason to create misunderstanding.

Attitude:

Finding from in-depth interview shows that irrigationists have good attitude toward local people. They realize that irrigation projects generate many consequences and uncomfortable outcomes to local people. i.e. making long duration of flooding in some areas in order to preserve agricultural products in nearby areas, generating sediment obstructing water transportation etc. but the local people mainly accept those outcomes and attempt to help themselves first whenever they have any problems related with water. Some complaints from local people are acceptable in the irrigationists' point of view as they are a nearly reliable tool for the irrigationists' performance appraisal. However, sometimes, irrigationists tend to ignore some complaints due to they believe that such complaints have occurred from non obvious understanding toward irrigationists work and responsibility.

Figure 8 the interviewing of Irrigationists

Conflicts - Two parts of Damnoen Saduak, upper and lower parts can cause conflicts sometimes. Upper areas often release contaminated water into canals which is flowing down stream to the lower parts which grows rice and fruits

Alternatives - RID makes a decision to integrate the water resource by participating of the people in the area, and the first project has already started since March 2004. RID persuades all local levels including people to come together to help one another in solving problems while RID supported necessary equipments.

Ta Luang Interviewing

There are about 18 local people of Ta Luang village who were in-depth interviewed base on perception, attitude, conflicts and alternative of the water allocation in Damneon Saduak's areas.

There are 14 males and 4 females of the age between 41 to 50 years old in average. Their educational backgrounds are mostly class 4 to 6. All interviewers settle on the up stream and down stream of irrigated canal.

Perception - Most people know the project but not clear about the objective and what will be benefits for them. They also complain about the lack of public relations to the local communities. The problem of pesticide contaminate from the paddy field discharge from up stream to the canal is dominant.

Attitude - Local people's attitude on the existing project is not so clear. They think the project cause the problems such as impede the transportation due to the regulator location, water level is not enough during the drought season. The irrigationists can't work properly and the equipment is not functional organizing.

Conflicts – Although it seems like there is a mainly physical conflict between irrigationists and local people as crowded problem of water hyacinths that obstruct the transportation way, there is a hidden conflict. Lack of channel of communication between two stakeholders brought about the problem of divergent understanding. The irrigationists think that they have already provided the best solutions under any limitations while the local people believe that those do not meet their needs. This conflict has never solved due to they together have no chance to express their needs and constraints.

Alternatives - RID should provide the appropriate equipment to remove water hyacinth from the canals that obstruct the transportation.

Figure 9 the interviewing of local peoples in Ta Luang, Damnoen Saduak

Chai Mongkol Interviewing

There are about 13 local people of Chai Mongkol village who were in-depth interviewed base on perception, attitude, conflicts and alternative of the water allocation in Damnoen Saduak'areas. The result was shown.

There are 12 males and 1 females of the age between 30 to 50 years old in average. Their educational background is mostly class 4 to 6. All interviewers settle on the up stream and down stream of irrigated canal. Most of the interviewees are the fishermen as they own their Gourami fishery farm in the study areas.

Perception - Local people's attitude on the existing project is quite good because the irrigationists can control suitable water level in the canals, the season changes, through. Water controlled can be used or agriculture, transportation and pushing intruding salt water from the southern part of the Mae Klong River.

Attitude - Local people's attitude on the existing project is not so clear. They think the project cause the problems especially flooding control in the rainy season. The irrigationists can't work properly and the equipment is not functional organizing. Machine usage for solving problem is an example explained different attitude toward two groups of stakeholders. Naga pumping is a main pumping tool for drain water in flood period. Chaimongkol people's perception is rather felt that this pumping tool is ineffective solution for solving such problem. The outcomes come about in differences such as pumped water by Naga pumping that none of irrigationists never explains to local water users make the doubtful among the effectiveness of RID on water allocation management.

Conflicts - RID's equipment not suitable for control flooding in the areas and cause the damage to their properties during the rainy season.

Alternatives – The output of the study shows that water problems in study areas could be reduced or solved by joining hands between the stakeholders; irrigationists and local people. The problem the local people accuse the irrigationists as they always avoid pumping out of water in flood areas were refused as it is not true by irrigationists as they have to concern overall effects in every areas. This conflict could be managed by a better way of two-way communication.

Main alternatives for this study are not only creating more of two way communication but also generating participation between the stakeholders in plausible steps of planning and implementing. The result of this study shows that problems in study areas could be solved by existing performance.

Additional Interview

Additional interview has been conducted at Ban Kunphitak for rechecking information gained from two previous study areas, Ta Luang and Chaimongkol. Three interviewees, two males and a female age between 31-42, is representative of water users' view through interviewing one by one. Most of them have a consensus that they have a main problem about seawater that drained from Bangkoltee village for a long time. The second problem is the water logging due to water hyacinth expanding.

Above two main problems have less consideration from both irrigationists and local people.

Figure 10 the interviewing of local peoples in Chai Mongkol, Ban Phraw

CHAPTER 5
DISCUSSIONS

The irrigation project was established in many years ago. It was an aspect of piecemeal project with the limitation of budget that makes this project inefficiency about planning and implementation. The inadequate basic facilities such as building and technicians make the obstacles on the project operation like ineffectiveness on water distribution system, water storage system, and drainage service. These events make the doubtful of trust among the local water users about the efficiency of the irrigation in Damneon Saduak. Most water user's complaint on the water drainage system and water controlling on the penetration of salinity from seawater in the south areas. As the Northern part of the project along with the Damneon Saduak canal in every rainy season, most water is discharged from the fields to the canals so the irrigationists have to drain those amounts of water out to balance the water level in Damneon Saduak. Sometimes, the water quality discharged is bad condition with higher standard of organics matter and chemical solvents from the agricultural material and pesticide can make the worse water quality. Thus, the irrigationists have to dilute those bad conditions with discharged water and make some flooding occurring in the downstream. The controlling of regulator to control the water balance is also an obstacle to the water transportation in Damneon Saduak canal. This reason makes the conflict of interest among the travelers on the perception to the irrigation project. In dry season, the limitation of water storage in Damneon Saduak canal makes the inequity of water distribution in some downstream areas. This also causes the unsatisfied attitude among the water users who are farmers. The conflicts of perception and attitude between water users and irrigationists on the water allocation project in Damneon Saduak canal can be classified as follows:

1) The water pumping and drainage system in rainy season are not effective due to the limited technology such as technicians and instruments including insufficient public relation from Royal Irrigation Department (RID) in the impacted areas. Most technicians who control the water balance at the regulator have inappropriate background of knowledge, as some of them are security men and not skillful technicians. The old-fashioned technologies of water balance and quality controlling of the project make the improper management in Damnoen Saduak canal. As the irrigationists are requiring more technology like computer simulation system and automatic device operation as real time operating system. There are some spots, near the Klong Sunakhorn, as leakage point of controlling the penetrated salinity of seawater as the limitation of water quality balance of the project. In Bangkontee, most water users who grow lichee don't want the constructed regulator at downstream, as they believe it has some connection between tidal effect and the taste of lichee. So the regulator will interrupt the natural tidal effect in downstream that they need. But the irrigationists have to control the salinity which causes great damage to the soil quality too.
2) The late public relation also causes damage to the crop and fishery farm in the flooding period. There are many complaints about the insufficient public relation that RID hardly corresponds with the water users in downstream areas. The sludge removal is also a problem emerged in these canal network as water users complaint about the ignorance of duty of irrigationists to dig and remove the sludge in canal that cause the struck of water flow and flooding in nearby areas. They ask for the responsibility of irrigationists to dredge sludge in every 5 years, as it used to be.
3) In terms of land use change due to the economic intensive, most farmers whose transform their career from orchard to fishery farm at downstream want more water support but the upstream farmers whose grow the orchard want to control the water level so this conflict need the appropriate management system about land use control. Many-trespassed house along the canals are also obstruct the accessibility of water channel management as sludge removing that they need the cooperation between RID and local people.

4) The lack of water control policy and planning make difficulty on the implementation in the Damneon Saduak irrigation project such as the justification of regulator demand for salinity control in specific area. The lack of shared information among water users in North and South part of Damneon Saduak Canal make the confusion of response problems about whose should be response and what direction of solution should be observed and implemented. For example, the wastewater is discharged from the upper areas to Damneon Saduak canal; the irrigationists have to dilute the low quality of those discharged as open the regulator but the downstream farmers complaint the affect to their orchards. The land use planning should also implement to control the conflict of interests among the water users. For example, in Chaimongkol Village have the significant fishery farming explode but the problem of water balance in the upper areas makes suffer to their product as wastewater are discharged to their farm.

Water users need benefits in all activities served with adequate water quality; their perception and attitude to irrigationists, especially in a drought period, change into bad feeling and negative thinking. And their needs can finally cause severe conflicts of interest because they make water users compete one another to get enough water for their own activities. While the irrigationists have to follow the policies that are serving people in quality and equity; their various duties are facing difficult obstacles such as water supply, desalination and drainage with government limited budget. Allocated water in the past and present is quite different to irrigationists who are to inform water users clearly and reasonably. Quantity of water given and served to water users by irrigationists' attitude may not be right; this make both of them be different in perceptions which probably cause those irrigationists as policy makers can not handle with many conflicts at once if they can not get along well with users. Communication between irrigationists and water users can reduce misunderstandings and unknown events in areas of problems because water users work and are spending more time there. Sometimes, they really want to inform the irrigationists about invasion of trespassed settlement along with canals or help irrigationists in keeping an eye on unfair act of strangers in order to find better alternatives. So, policy and planning in

allocating water should let water users participate and be good awareness of their decisions. Irrigated water resource management can be the right answer in terms of sharing water quality and equity with less disturbing on ecosystem (Figure 11).

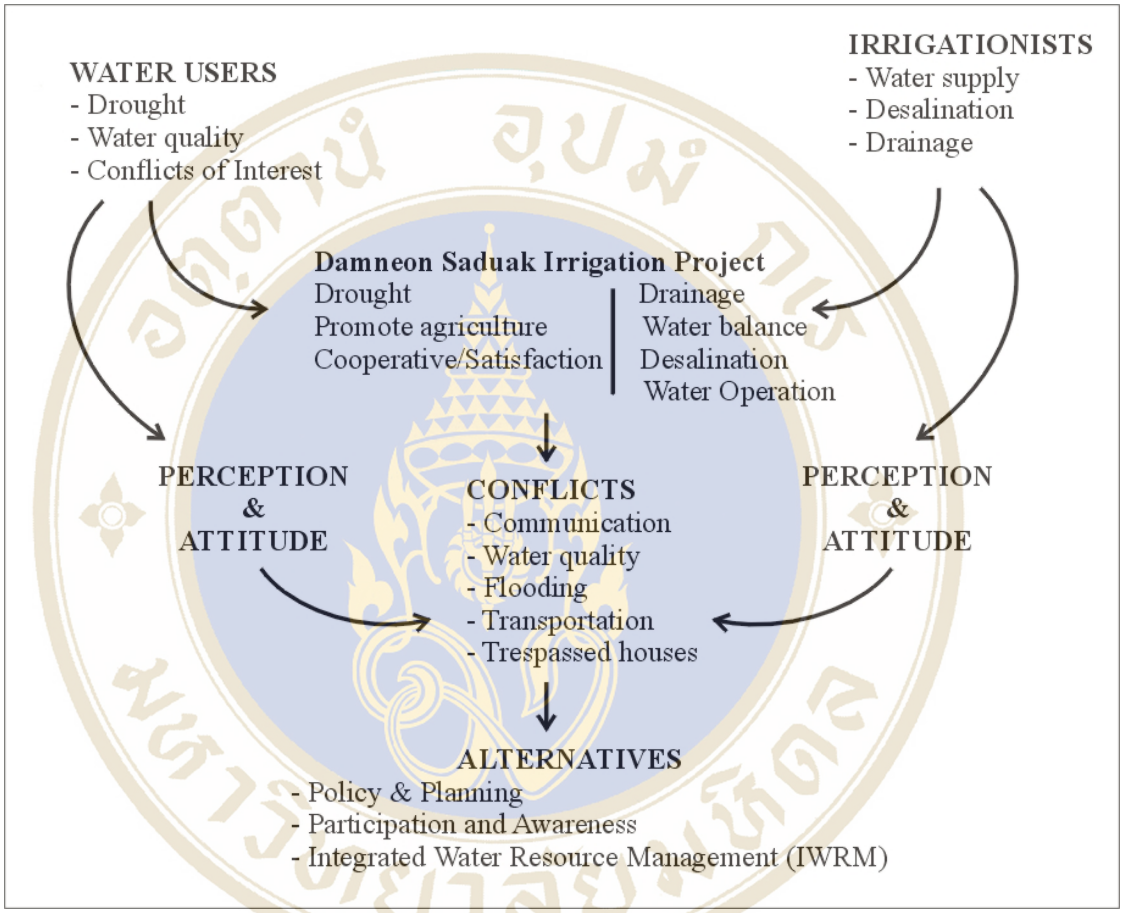


Figure 11 Framework of Discussion

In order to protect damage of floodwater in irrigation area of Nakornchum, Nakonpathom, and release bank of Ratchaburi and Damneon Saduak. The construction of measurement and suitably brought to handle with floodwater and this is the main factor of many choices.

- Build irrigative station and install automatic pumping permanently.
- Build dike and fix irrigating control building
- Removing the sedimentation in irrigated canal and diverting canals.

Conflicts of interest among water users can be solved with providing good facilities in the communities and let them take part in both solution and policies.

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

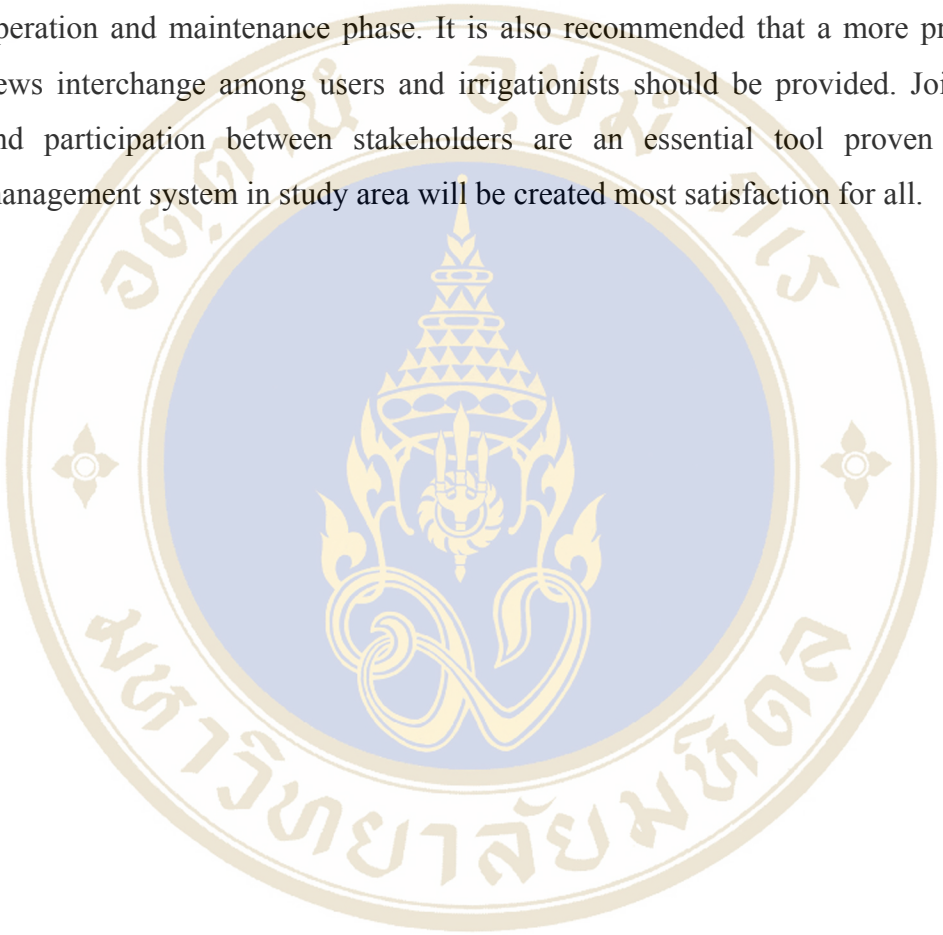
A major finding found in Ta Laung and Chaimongkol are the lack of complete irrigation project's information. Almost of local people have know about the proceeding of irrigation project but they perceive as what they see. The conflict between water users and irrigationists usually occur in case of the affects of irrigation system make the disadvantage to the water user's benefits. People participation can be the one of the conflict solution to the irrigation project as know as "water user organization".

According to the interview of irrigationists of RID said that this agency will be the representative of stakeholder to act as real time monitoring for the cause of conflicts or problems such as flooding, waste water discharged, inequity distribution of water, etc. that will help irrigationists to manage the problem for the highest pleasant for all. Another important finding is that there is a significant difference between the perception of water users and that of technical irrigationists in the area of water resource management situation. There are some differences between the perceptions of irrigationists and water users, but not between the perceptions of sub-groups of water users. Results of people in both areas show that the opinion of the water users should be consulted in their areas as soon as they need help or suggestions from irrigationists.

The failure have generally resulted from man's inability to apply the knowledge and processes available to them and this, however, implies seriously lacked attention from the irrigation projects, as well as the ability of water users and other decision-makers

to accurately perceive both the problem and the range of alternative solutions available to them.

It is recommended that irrigation project should allow water users to participated in water management at every step, such as, planning phase, construction phase, and operation and maintenance phase. It is also recommended that a more promoting of news interchange among users and irrigationists should be provided. Joining hands and participation between stakeholders are an essential tool proven that water management system in study area will be created most satisfaction for all.



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APPENDIX

D2 Regulator

D3 Regulator

D4 Regulator

D7 Regulator

Tha Lang Regulator

Bang Pan Regulator

Bangyang Regulator

Figure 12 regulators in Damneon Saduak Irrigation Project

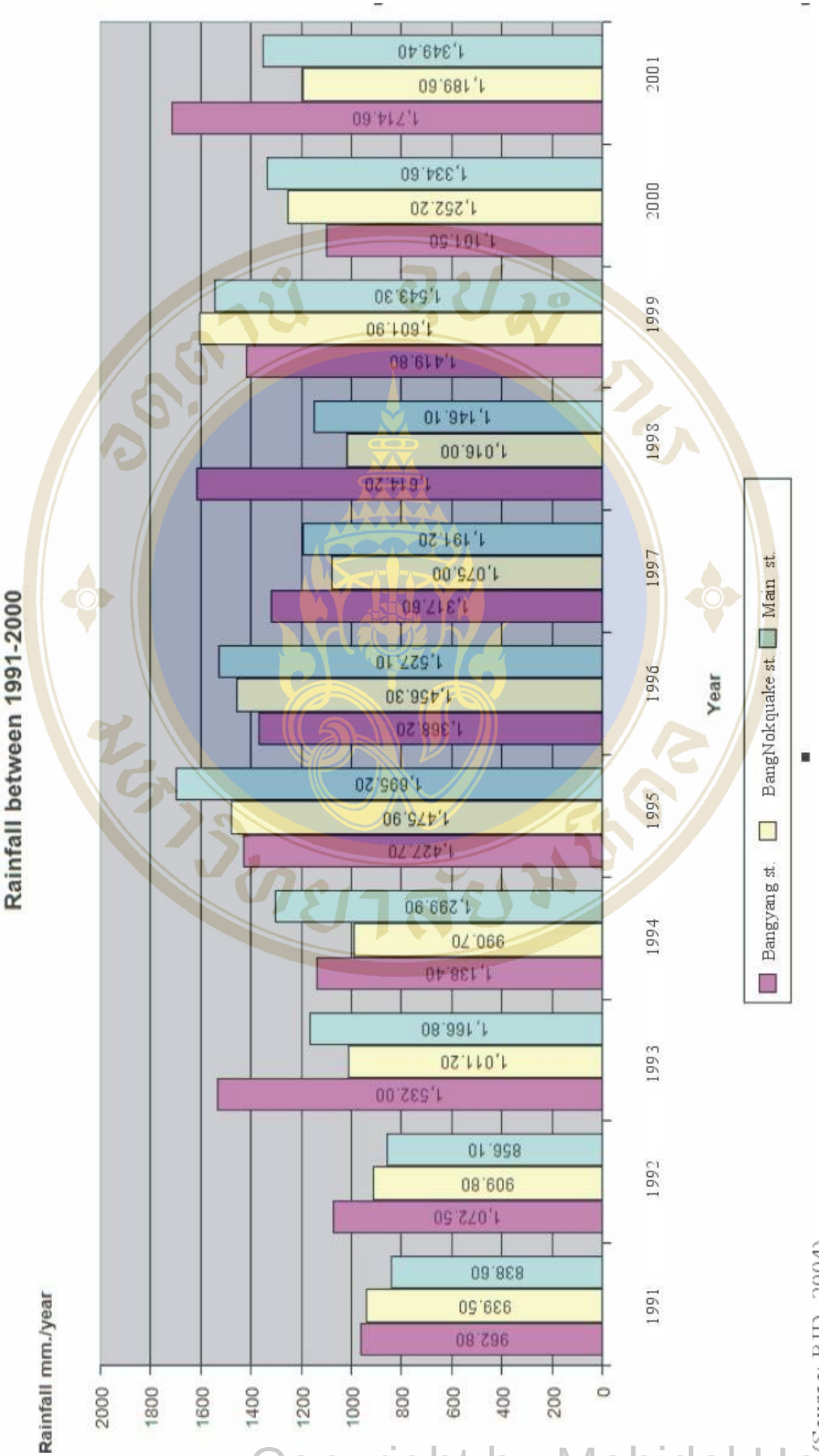
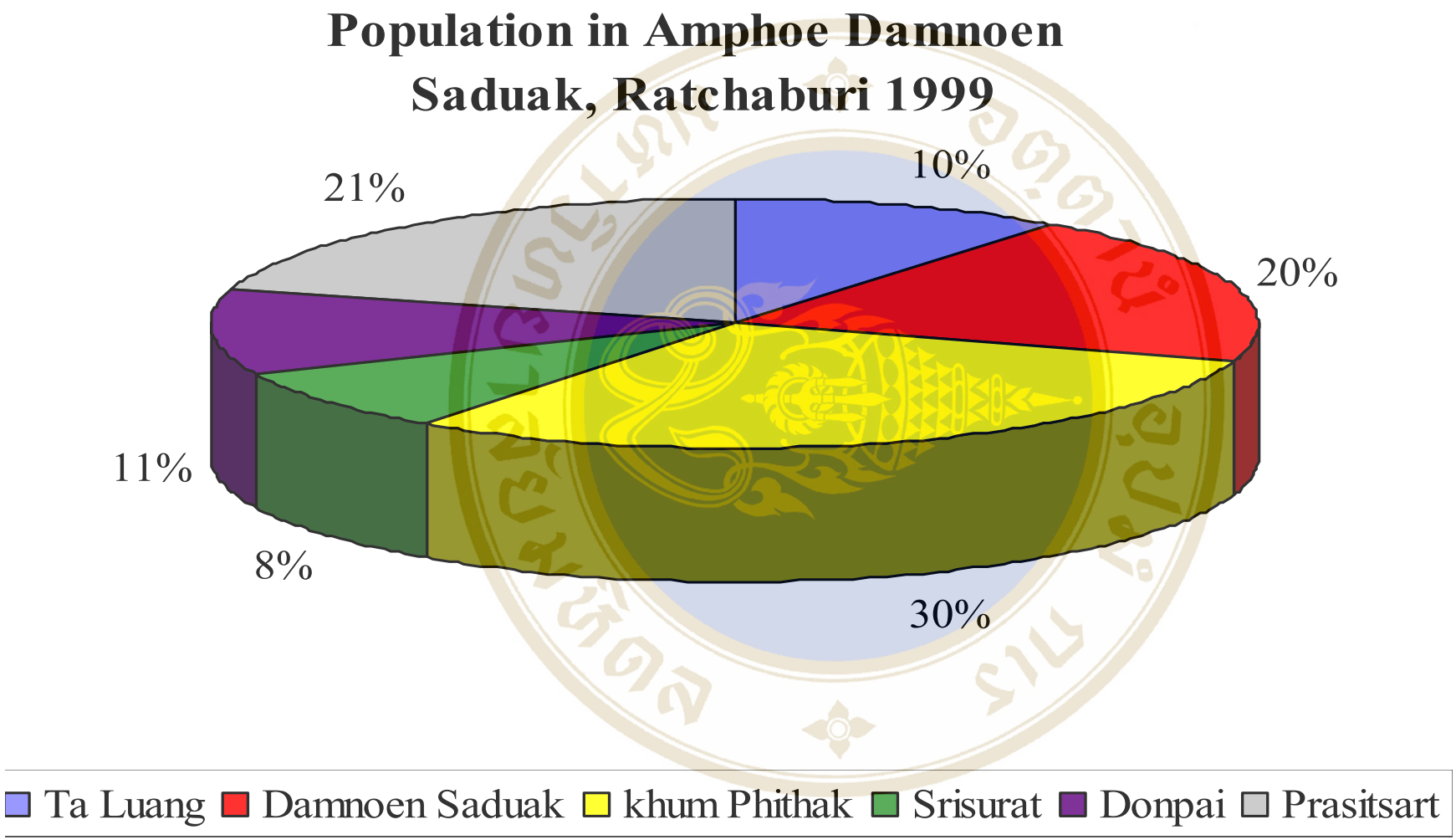


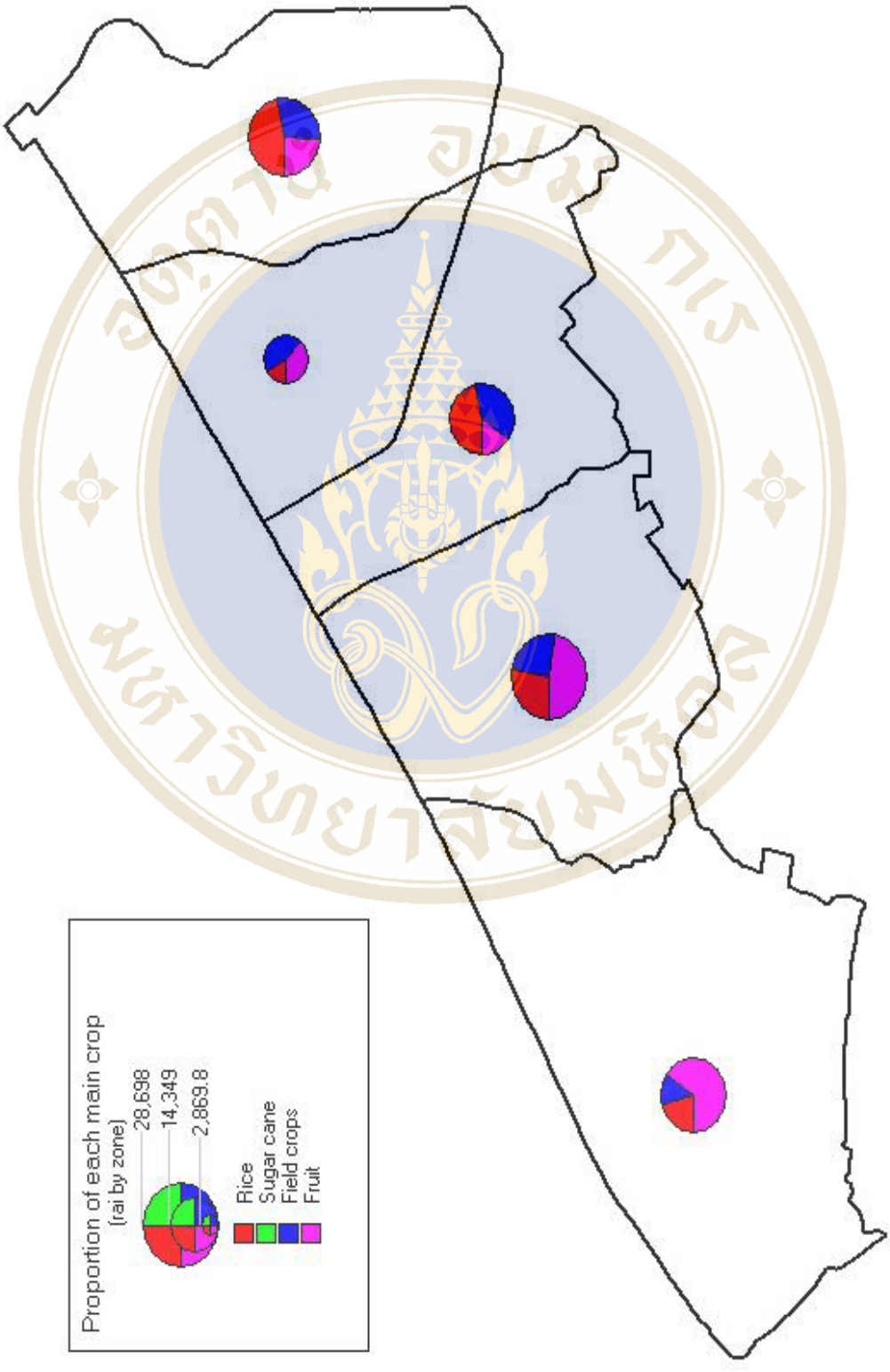
Figure 13 Rainfall between 1991-2000 in Ratchaburi

(Source: RID, 2004)



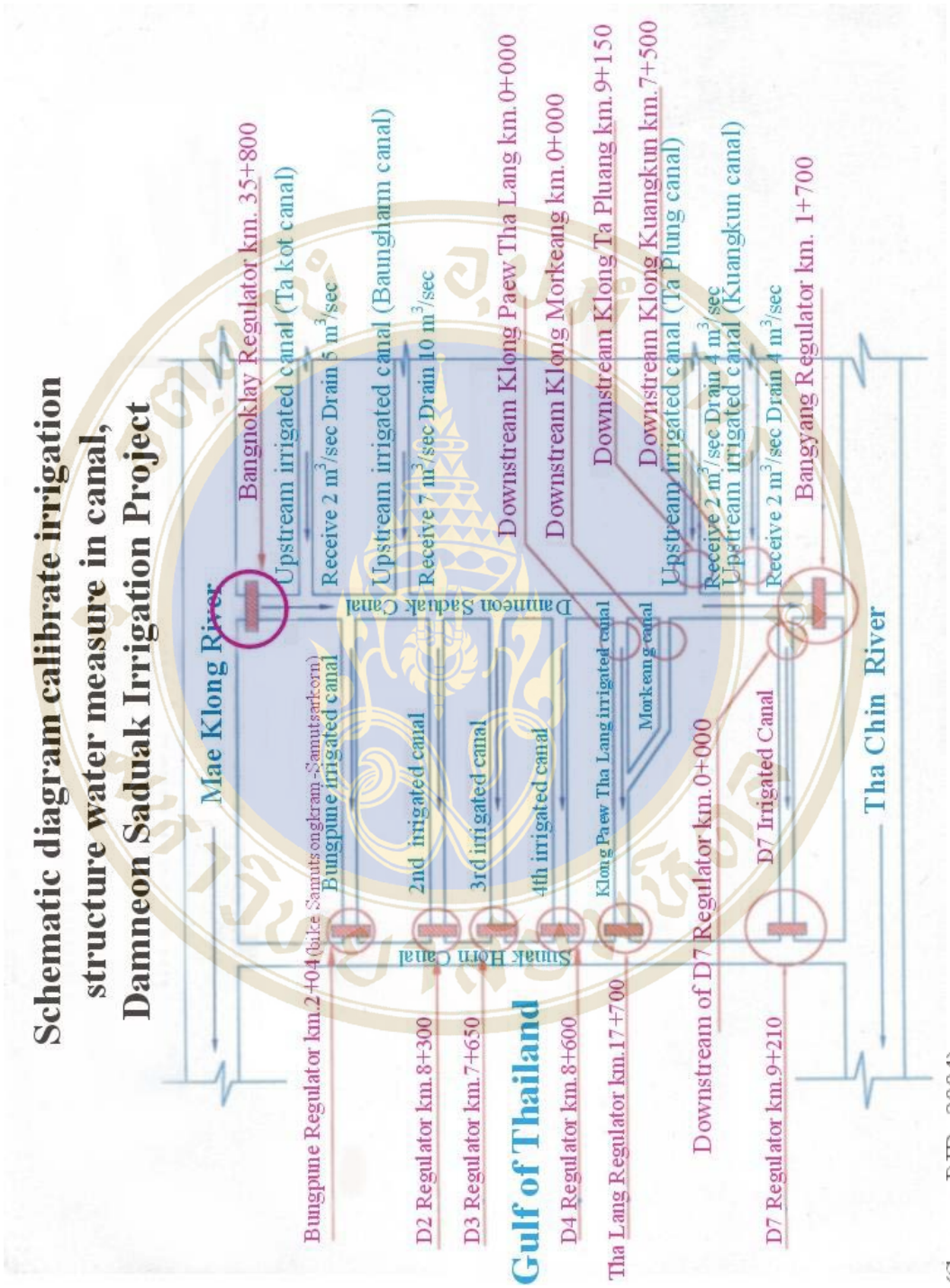
(Source: RID, 2004)

Figure 14 Population in Damnoen Saduak, Ratchaburi



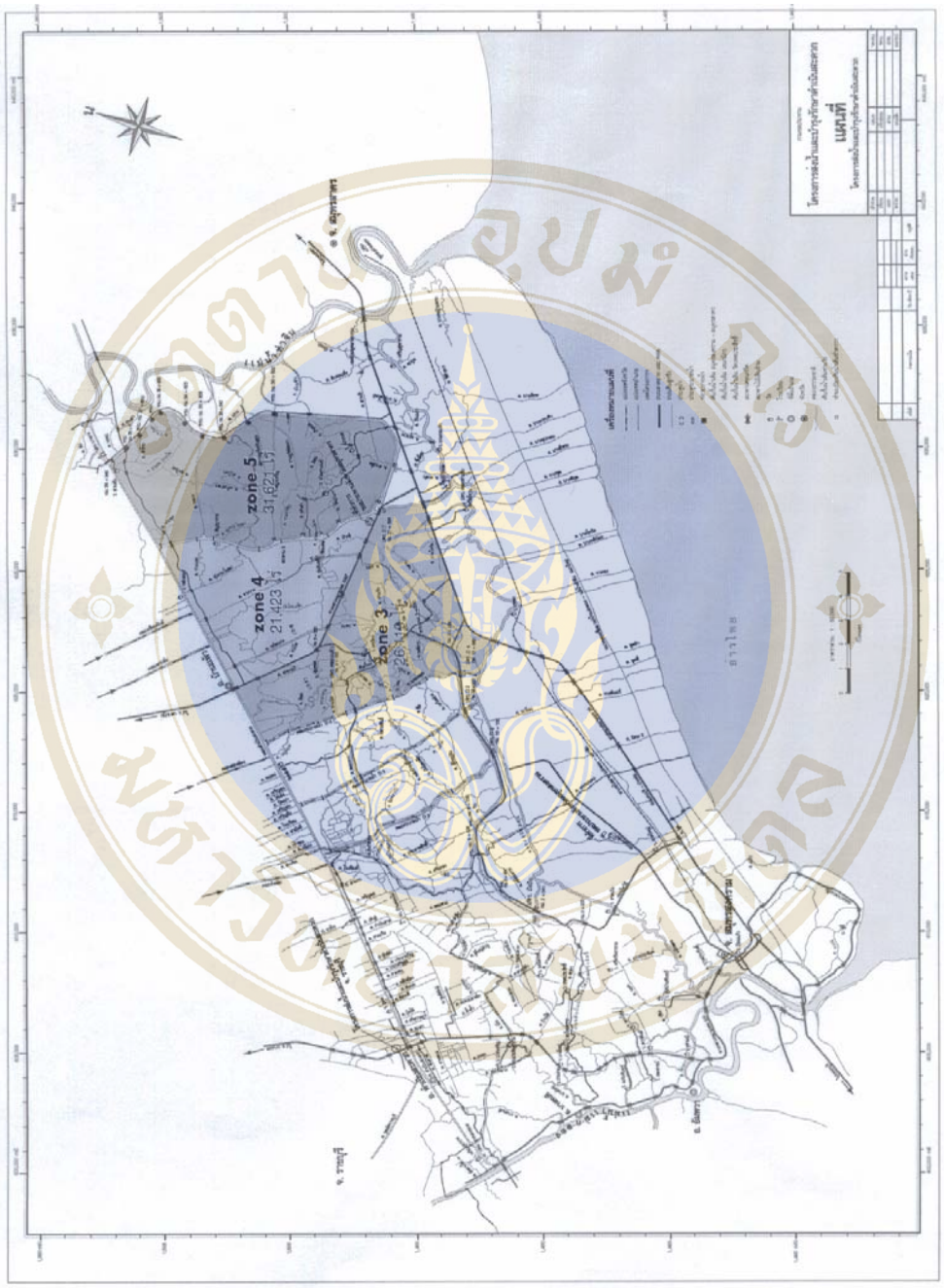
(Source: RID, 2004)

Figure 15 Fruit production of each main crop in Damnoen Saduak Irrigation Project



(Source: RID, 2004)

Figure 16 Water quantity chart of Damnoen Saduak Irrigation Project



(Source: RID, 2004)

Figure 17 Master Plan of Damnoen Saduak Irrigation Project

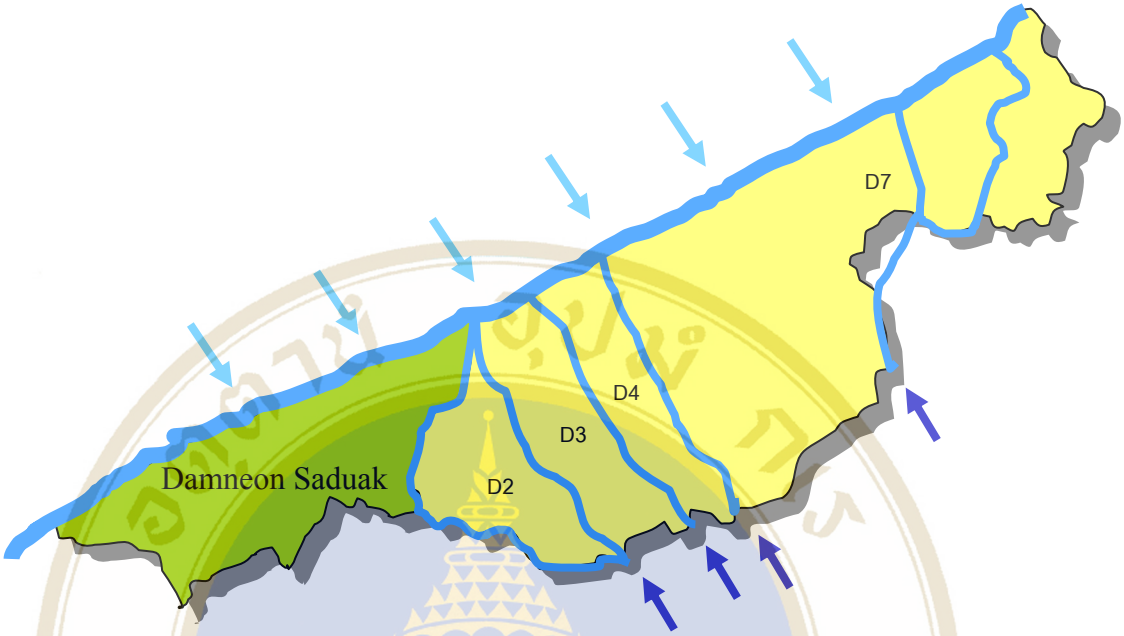


Figure 18 Water flow pattern in Damnoen Saduak

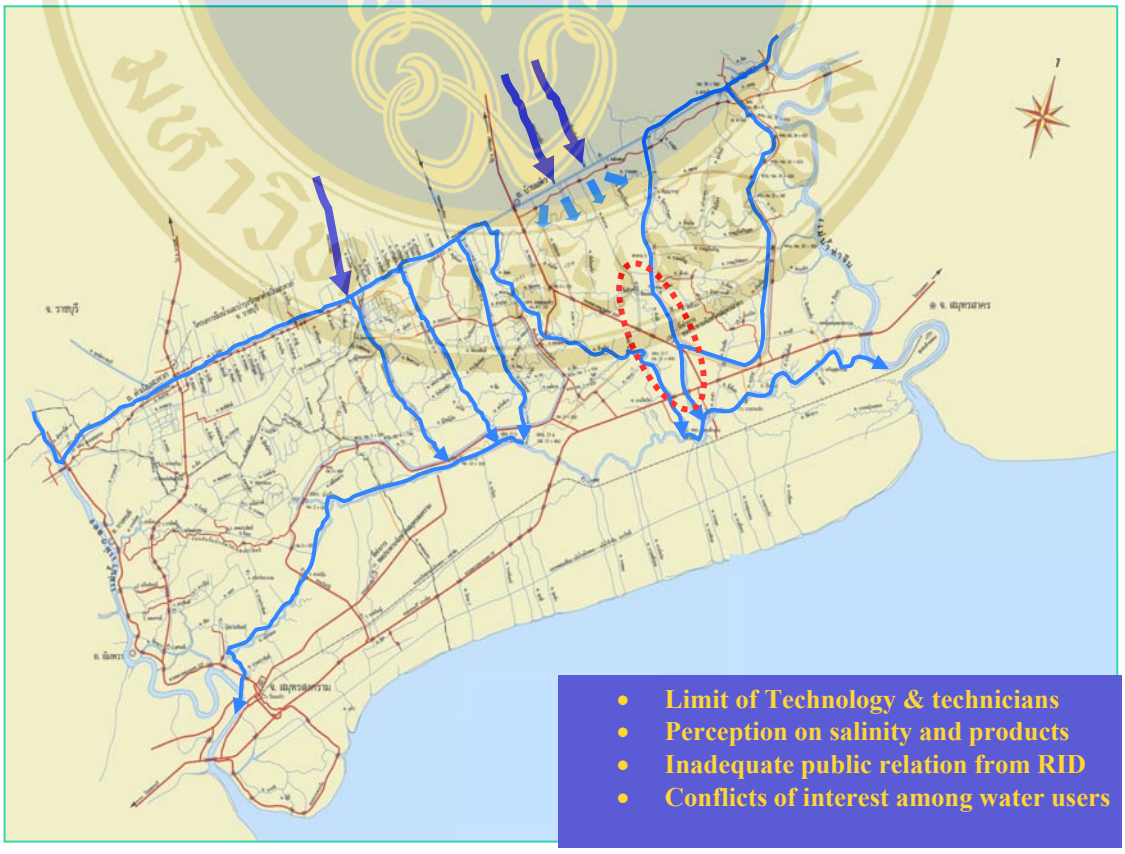


Figure 19 Water flow pattern in Damnoen Saduak

แบบสอบถาม

เรื่อง การจัดสรรน้ำในเขตชลประทานดำเนินสะดวก

ศึกษากรณี ทัศนคติ ความขัดแย้ง ทางเลือก โดยเปรียบเทียบกลุ่มเกษตรกร และเจ้าหน้าที่ชลประทานในพื้นที่

ตอนที่ 1 : สถานภาพและภูมิหลังของผู้ตอบแบบสอบถาม

คำชี้แจง : โปรดเลือกทำเครื่องหมาย / ลงในช่อง ( ) ตามสถานภาพที่เป็นจริงของท่าน

(1) ข้อมูลทั่วไป

เพศ

( ) 1. หญิง

( ) 2. ชาย

อายุ

( ) 1. ต่ำกว่า 30 ปี

( ) 2. ระหว่าง 31-40 ปี

( ) 3. ระหว่าง 41-50 ปี

( ) 4. 51 ปีขึ้นไป

วุฒิการศึกษา

( ) 1. ไม่ได้เรียนหนังสือ

( ) 2. ต่ำกว่า ป. 4

( ) 3. ป. 4 – ป. 6

( ) 4. สูงกว่า ป. 6

( ) 5. ม. 1 – ม. 3

( ) 6. ม. 4 – ม. 6

( ) 7. สูงกว่า ม. 6

( ) 8. ปริญญาตรี

( ) 9. สูงกว่า ปริญญาตรี

สถานภาพสมรส

( ) 1. โสด

( ) 2. สมรส

( ) 3.หม้าย

ที่อยู่อาศัย

( ) 1. เป็นเจ้าของ

( ) 2. เช่า

( ) 3. อาศัยผู้อื่นอยู่

( ) 4. อื่น ๆ

อาชีพ

( ) 1. เกษตรกร

( ) 2. เจ้าหน้าที่ชลประทาน

( ) 3. อื่น ๆ

(2) กรณี เป็น เกษตรกร

ลักษณะการถือครองที่ดินในการทำการเกษตร

( ) 1. เป็นเจ้าของ ( ) 1-5 ( ) 6-10 ( ) 11-15 ( ) 16-20

( ) 21-30 ( ) 31-40 ไร่

( ) 2. เช่า ( ) 1-5 ( ) 6-10 ( ) 11-15 ( ) 16-20

( ) 21-30 ( ) 31-40 ไร่

( ) 3. อาศัยผู้อื่นอยู่ ( ) 1-5 ( ) 6-10 ( ) 11-15 ( ) 16-20

( ) 21-30 ( ) 31-40 ไร่

( ) 4. ที่รกร้างว่างเปล่า ( ) 1-5 ( ) 6-10 ( ) 11-15 ( ) 16-20 ( ) 21-30

( ) 31-40 ไร่

การมีเอกสารสิทธิ์

( ) 1. มี

( ) 2. ไม่มี

การถือครองทรัพย์สินของครัวเรือน

( ) 1. ตู้เย็น

( ) 2. วิทยุ

( ) 3. โทรทัศน์

( ) 4. จักรยาน

( ) 5. รถมอเตอร์ไซต์

( ) 6. รถปิกอัพ

( ) 7. รถยนต์

( ) 8. รถแทรคเตอร์

( ) 9. เครื่องปั๊มน้ำ

( ) 10. เรือและเครื่องยนต์

( ) 11. รถไถเดินตาม

( ) 12. อีแต๋น

อาชีพหลัก

( ) 1. เกษตรกรรม

( ) 1.1 ปลูกข้าว

( ) 1. 2 ปลูกอ้อย

( ) 1. 3 ปลูกองุ่น

( ) 1. 4 ปลูกหน่อไม้ฝรั่ง

( ) 1. 5 อื่น ๆ

( ) 2. ปศุสัตว์

( ) 2.1 วัว

( ) 2.2 หมู

( ) 2.3 เป็ด

( ) 2.4 ไก่

( ) 3. ประมง

( ) 3.1 ปลาเศรษฐกิจ

( ) 3.2 ปลาสวยงาม

( ) 4. เจ้าหน้าที่ชลประทาน

สภาพการออมและหนี้สิน

( ) 1. มีเงินเก็บ

( ) 2. มีเงินหนี้สิน

การจัดรูปที่ดิน

( ) 1. มี

( ) 2. ไม่มี

บริเวณที่ตั้งของที่ดิน

( ) 1. ต้นคลองส่งน้ำ

( ) 2. กลาง คลองส่งน้ำ

( ) 3. ปลายคลองส่งน้ำ

การมีพื้นที่อยู่ติดคลองส่งน้ำ

( ) 1. ติด

( ) 2. ไม่ติด

การรับน้ำเข้าพื้นที่ (เฉพาะผู้ที่ไม่อยู่ติดคลองส่งน้ำ)

( ) 1. ใช้เครื่องสูบน้ำ

( ) 2. ขุดคลองซอยแยกเข้ามา

( ) 3. อื่น ๆ .....

จำนวนแรงงานที่มี ( ) 1-5 ( ) 6-10 ( ) 11-15 ( ) 16-20 ( ) 21-30

( ) มากกว่า 30 คน

ตอนที่ 2 การรับรู้ และทัศนคติ ความขัดแย้ง แนวทางแก้ไข และ มีส่วนร่วมแก้ไขปัญหา

ตามความคิดเห็นของท่านควรมีคุณลักษณะต่อไปนี้ในระดับใด โปรดทำเครื่องหมาย / ลงในช่อง ที่ตรงกับความเห็นของท่าน

1 การชลประทานในเขตดำเนินสะดวกด้านต่าง ๆ มีปัญหาต่อท่านระดับใด

ข้อ	ความคิดเห็น	ระดับ				
		มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
1.	การคมนาคม					
2.	พื้นที่เกษตร					
3.	ปริมาณน้ำ					
4.	คุณภาพน้ำ					
5.	การเลี้ยงสัตว์					
6.	การประมง					

2 ปัญหาของสมาชิกในเขตชลประทาน ตามทัศนะของท่าน อยู่ระดับใด

ข้อ		ระดับ				
		มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
1.	ไม่เคารพกฎ					
2.	ไม่ซ่อมแซมคลองส่งน้ำ					
3.	เห็นแต่ประโยชน์ส่วนตน					

3 มีการนำเครื่องจักรกล และ วัสดุ มาใช้ในการชลประทานในเขตดำเนินสะดวกด้านต่าง ๆ ระดับใด

ข้อ	ความคิดเห็น	ระดับ				
		มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
1.	มีการจัดซื้อวัสดุให้สอดคล้องกับการใช้งาน					
2.	วัสดุมีคุณภาพ เหมาะสมกับการใช้งาน					
3.	มีวัสดุเพียงพอกับการใช้งาน					
4.	มีการใช้เครื่องมือทันสมัยในการปฏิบัติงาน					
5.	มีการดูแลรักษาเครื่องมือให้พร้อมที่จะปฏิบัติงาน					

4. ท่านทราบข่าวสารการจัดการชลประทานในเขตดำเนินสะดวก อย่างไร

ข้อ	ความคิดเห็น	ระดับ				
		มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
1.	วิทยุรายการเกษตร					
2.	เอกสารเผยแพร่ของหน่วยชลประทาน					
3.	หนังสือพิมพ์					
4.	เจ้าหน้าที่ชลประทาน					
5.	เจ้าหน้าที่หรือผู้ประสานงานการปันน้ำ					

5 การจัดการของหน่วยชลประทาน

ข้อ	ความคิดเห็น	ระดับ				
		มากที่สุด	มาก	ปานกลาง	น้อย	น้อยที่สุด
1.	ท่านได้รับคำแนะนำ ให้ความรู้ ความเข้าใจเกี่ยวกับระบบการชลประทาน					
2.	กรมชลประทานมีการจัดสรรงบประมาณอย่างเพียงพอ เพื่อใช้ในโครงการ					

3.	มีการวางแผนการงบประมาณให้สอดคล้องกับงาน					
4.	มีการวางแผนและจัดลำดับที่ดี ไม่ซ้ำซ้อน					
5.	มีการจัดระบบการประสานงานกับหน่วยงานที่เกี่ยวข้อง					
6.	มีการจัดระบบการให้บริการตามความจำเป็นเร่งด่วน					
7.	มีการติดตามผลการปฏิบัติงาน					
8.	ท่านได้รับน้ำเท่าเทียมกับผู้ใช้น้ำคนอื่น					
9.	ความพอเพียงของเจ้าหน้าที่ดูแล					
10.	ท่านพอใจระบบส่งน้ำ					
11.	ท่านพอใจปริมาณน้ำที่ได้รับ					
12.	ท่านพอใจในการทำงานของหน่วยชลประทาน					
13.	ท่านพอใจระบบส่งน้ำ					
14.	หน่วยชลประทานได้ติดตามและแก้ไขปัญหาข้อขัดแย้งในการใช้น้ำ เพื่อการเกษตรของเกษตรกร					
15.	มีขั้นตอนในการขอน้ำจากชลประทานมาก					
16.	มีคู่มือในการกำหนดพื้นที่ฤดูแล้งในการเพาะปลูก					
17.	การร่วมวางแผน ร่วมกำหนดขั้นตอน วิธีการทำงาน กิจกรรมเกี่ยวกับแหล่งน้ำ					
18.	การได้ร่วมดูแล รักษา ซ่อมแซมคลองส่งน้ำ					
19.	จัดตั้งกลุ่มผู้ใช้น้ำ ให้ความรู้ ประสานงานกับกรมชลประทาน					

6. การที่ท่านได้มากกว่าหรือน้อยกว่า ผู้ใช้คนอื่น เพราะ
   ( ) อยู่ปลายคลอง
   ( ) อยู่ต้นคลอง
   ( ) ประตูเปิด-ปิดชำรุด
   ( ) กรรมการกลุ่มจัดสรรน้ำไม่เป็นธรรม

( ) สภาพพื้นที่รับน้ำไม่สะดวก

7. ช่วงเวลาที่เกิดปัญหาการใช้น้ำ

( ) ช่วงการเตรียมแปลง

( ) ช่วงการเจริญเติบโต

( ) ช่วงพืชกำลังออกดอก

( ) ไม่มีปัญหา

8. ท่านคิดว่าแนวทางที่จะทำให้ปริมาณน้ำที่ท่านได้รับ เพียงพอต่อความต้องการ ควรทำอย่างไร

( ) ให้ชลประทานส่งน้ำให้มาก ๆ

( ) ให้ผู้ใช้น้ำประหยัดการใช้น้ำให้มากขึ้น

( ) ไม่มี

( ) อื่น ๆ

9. เมื่อเกิดปัญหาการใช้น้ำ ภายในเขตชลประทาน ท่านทำอย่างไร

( ) แจ้งเจ้าหน้าที่ชลประทาน

( ) แจ้งหัวหน้ากลุ่ม

( ) ตัดสินปัญหาเอง

( ) อื่น ๆ .....

10. ท่านคิดว่า การเผยแพร่ความรู้ ประชาสัมพันธ์ การใช้น้ำ วิธีใด น่าจะเหมาะสม

( ) การประชุม และบรรยาย อภิปราย

( ) การดูเทปโทรทัศน์

( ) ป้ายโฆษณา เอกสารประชาสัมพันธ์

( ) อื่นๆ

ตอนที่ 3 : แบบสอบถามปลายเปิด

กรุณาแสดงความเห็นเพิ่มเติม ในประเด็นการจัดการชลประทานต่อไปนี้

1. ด้านบุคคลากร

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2. ด้านเครื่องจักรกล และ วัสดุ

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3. ด้านการจัดการของกรมชลประทาน

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ขอขอบคุณ

ที่ให้ความอนุเคราะห์ในการตอบแบบสอบถาม

BIOGRAPHY

NAME	Mr. Aunnop Arirat
DATE OF BIRTH	8th December 1958
PLACE OF BIRTH	Kanchanaburi, Thailand
INSTITUTIONS ATTENDED	Ramkhamhaeng, 1987: Bachelor of Art (Linguistic) Mahidol University, 2004 : Master of Science (Environmental Management)
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HOME ADDRESS	215 Sengchuto road T. Bannue A. Maung, Kanchanaburi Tel. 01 9149091