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THE ROLE OF TAMBON ADMINISTRATIVE ORGANIZATIONAL COMMITTEE FOR SUSTAINABLE NATURAL RESOURCES MANAGEMENT IN KANCHANABURI PROVINCE

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บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล

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Thesis

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THE ROLE OF TAMBON ADMINISTRATIVE ORGANIZATIONAL COMMITTEE FOR SUSTAINABLE NATURAL RESOURCES MANAGEMENT IN KANCHANABURI PROVINCE

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THE ROLE OF TAMBON ADMINISTRATIVE ORGANIZATIONAL COMMITTEE FOR SUSTAINABLE NATURAL RESOURCES MANAGEMENT IN KANCHANABURI PROVINCE

was submitted to the Faculty of Graduate Studies, Mahidol University
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The objective of this research was to study and compare the roles of the Executive Committees of the Tambon Administrative Organizations in sustainable management of natural resources in Kanchanaburi Province. Also, it was aimed at studying other opinions related to sustainable practices in natural resources management.

The researcher constructed a random sample of 156 , who were members of the Executive Committees of the Tambon Administrative Organizations in Kanchanaburi Province, and used questionnaires for data collection. To analyze the data, the researcher used frequency, percentage, means, standard deviation, mode, the t-test, the one-way analysis of variance, and the Scheffe' Test.

The results revealed that, in general, the Executive Committees of the Tambon Administrative Organizations perform moderate roles in the management of forest and water resources, with minimal roles in the management of soil, wild animals and mineral resources. In addition, when comparing the roles of the Executive Committees of the Tambon Administrative Organizations, according to the designated variables, i.e., gender, age, occupation, educational level, and training in natural resources management, no differences of statistical significance were found.

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ร.ต.อ.พงษกร อุปพงษ์ : บทบาทของคณะกรรมการบริการองค์การบริการส่วนตำบลที่เกี่ยวกับการบริหารจัดการทรัพยากรธรรมชาติที่ยั่งยืน ในจังหวัดกาญจนบุรี (THE ROLE OF TAMBON ADMINISTRATIVE ORGANIZATIONAL COMMITTEE FOR SUSTAINABLE NATURAL RESOURCES MANAGEMENT IN KANCHANABURI PROVINCE) คณะกรรมการควบคุมวิทยานิพนธ์ : ศุภชัย ศุกรวรรณ, พบ.ม. (สถิติประยุกต์), ศิริชัย ชินะตังกูร, Ph.D., วศิน ปลื้มเจริญ, ศษ.ม. 116 หน้า ISBN 974-04-1994-1

การศึกษาวิจัยครั้งนี้มีวัตถุประสงค์เพื่อศึกษาและเปรียบเทียบบทบาทของคณะกรรมการบริหารองค์การบริหารส่วนตำบล จังหวัดกาญจนบุรี เกี่ยวกับการบริหารจัดการทรัพยากรธรรมชาติที่ยั่งยืน และเพื่อศึกษาความคิดเห็นอื่นที่เกี่ยวข้องกับการบริหารจัดการทรัพยากรธรรมชาติที่ยั่งยืน

กลุ่มตัวอย่างที่ใช้ในการวิจัยครั้งนี้ เป็นคณะกรรมการบริหารองค์การบริหารส่วนตำบลในจังหวัดกาญจนบุรี รวม 156 คน โดยใช้แบบสอบถามเป็นเครื่องมือในการเก็บรวบรวมข้อมูล การวิเคราะห์ข้อมูลใช้การแจกแจงความถี่ ค่าร้อยละ ค่ามัชฌิมเลขคณิต ค่าเบี่ยงเบนมาตรฐาน ฐานนิยม วิเคราะห์ความแตกต่างโดยใช้สถิติ t-test และวิเคราะห์ความแปรปรวนทางเดียว (One Way Analysis of Variance) และวิเคราะห์ความแตกต่างรายคู่ด้วยวิธีเชฟเฟ (Scheffe' test)

ผลการวิจัยพบว่า โดยรวมคณะกรรมการบริหารองค์การบริหารส่วนตำบล มีบทบาทในการบริหารจัดการทรัพยากรธรรมชาติที่ยั่งยืน โดยปฏิบัติในระดับปานกลางด้านทรัพยากรป่าไม้และด้านทรัพยากรน้ำ ส่วนด้านทรัพยากรดิน สัตว์ป่า และแร่ธาตุปฏิบัติอยู่ในระดับน้อย และเมื่อเปรียบเทียบบทบาทของคณะกรรมการบริหารตามตัวแปร คือ เพศ อายุ อาชีพ ระดับการศึกษาและการได้รับการอบรมด้านทรัพยากรธรรมชาติ พบว่าโดยรวมไม่แตกต่างกันอย่างมีนัยสำคัญทางสถิติ

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CHAPTER I

INTRODUCTION

1.1 Background of the study

It is generally accepted that, at present, human beings have paid greater attention to the environment and their co-existence with the environment than as in the past. This would partially due to the fact that there are greater effects from technological progress, environmental degradation, and rapid population growth. These include problems related to the attempts to seek substitution power and other factors affecting living conditions of people, thereby urging human beings to properly adjust themselves to the environment. Also seen, as another major factor affecting environmental condition are human endeavors to change the environment to meet their needs. The current eco-system and the environment are now at a critical stage, and deterioration is likely to increase overtime. Main attributes could be summarized as: (1) depletion of natural endowments is now at an alarming level. (2) Garbage and wastes have been increasingly disposed to global environment, hazardous to human beings, animals and plants. And, (3), global population still continues to increase in certain parts of world, thus increasing exploitation of natural resources and pollutions (Phra Dhammaphidok, 1986: 72-73). Sooner or later, unless human beings were to adopt any proper practices, enhancing the maintenance of essential resources, i.e., soil, forest, air, water, and minerals (The Alumni Association of Students under Thai Government Scholarships, 1998: 65), human beings would unavoidably encounter

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adverse consequences from environmental degradation, which would rapidly be harmful to the Thai people at large (Piyakan, et. al., 1990: Abstract).

Amid the presently depleting environment, only the maximization of natural resources, with minimized effects on the environment, is no longer sufficient. It is of great necessary to rehabilitate environmental quality, or rebuild the depleting one, which is, in fact, is a main principle for natural resource conservation.

The government, therefore, has set management policies for natural resources and the environment, which will contribute to people's living, and also sustainable development of the country. These policies have been included in the Eighth National Economic and Social Development Plan (1997-2001) (1996:136), under main objectives, as follows:

1) To ensure proper utilization and rehabilitation of natural resources, while maintaining sound quality of the environment to enhance sustainable development of the economy and quality of life.

2) To promote efficient management of natural resources and the environment in order to ensure balance in the eco-system and environment, based on multi-lateral cooperation. Local people and communities should be encouraged to increasingly participate in the local natural resources management and environmental protection, under support from the government, academics, non-governmental organizations (NGOs) and private businesses.

In addition, during the five-year period (2002-2006) of the Ninth Economic and Social Development Plan, the government has designated development vision and

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direction concerning management strategies for natural resources and environment (2000: 33-34), as follows:

1) The conservation and rehabilitation of natural resources and environmental management will rely on active participation of local people and communities, through the following measures:

1.1 To rehabilitate natural resources now facing a state of severe degradation, including forest, mangrove forest, soil and water resources, coastal resources and the sea.

1.2 To provide opportunities for, and enable the local communities and people to increasingly participate in natural resources rehabilitation and environmental management on a more practical manner. Emphasis will on the move the promote public awareness, application of preventive measures, and shared expenses.

1.3 To strictly enforce the laws with regard to natural resources and environmental management.

2) The Ninth Plan will promote sustainable uses of natural resources, compatible with existing potentials, and create fairness in uses, not to affect the environment, by:

2.1 To promote utilization of natural resources for economic activities proper for the existing potential and fairness in society, not to affect the environment. These can be done through the enforcement of laws governing land uses for agriculture, manufacturing, housing and forest areas. These include measures to protect certain farming areas, in which the government has constructed irrigation system.

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2.2 To maximize uses of water resources in line with local demand. Water resources will be allocated on a natural basis, sufficient for local demand. These will be managerial mechanisms at a river basis level, based on participation of local people, communities, and community organizations.

Kanchanaburi Province, once endowed with natural resources, possesses the total areas of 19, 483, 148 square kilometers, or about 12, 176, 967.5 rai. Most of its areas are forest areas and mountains. Given the total numbers of national parks, wildlife sanctuaries, forest reserves, and military-restricted areas, the whole areas of Kanchanaburi Province are forest areas. According to the remote-sensing survey in 1978, however, Kanchanaburi possessed total forest areas of 8,300,625 rai, or 68.41 percent of the total areas. In 15 years (1978-1993), the provincial forest areas dropped by 1,568,875 rai, or approximately 100,000 rai per annum (Kanchanaburi Provincial Forestry Office: 1997). The Province, moreover, is endowed with plenty of mineral resources, i.e., lead, tin, wolfram, antimony, fluoride, chromite, phosphate, kaolin, granite, and sources of mineral water, etc. There are also natural sources of water, culturing a wide variety of aquatic animals, which also contribute greatly to tourism, agriculture and manufacturing.

However, the problems of natural resources and environmental degradation in Kanchanaburi Province have increasingly aggravated. The survey results, conducted by the Provincial Sustainable Strategic Development Planning Committee (2000: 75-76), showed that soil resources were deteriorating. Soil surface was eroding, while land use zoning was improper for its potentials. These included problems concerning forest resources and poaching. Forest fire broke out both naturally and man-made. People encroached into and illegally occupied forest areas. As for surface and

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underground water, water volume was insufficient for local demand. Its quality worsened and was contaminated, with improper management for water resources and river basins, as the networks. Mineral resources were used extensively, and heavy metals were released into rivers. The management of mineral resources was improper, and minerals were not used fully, etc.

Despite the government attempts to solve natural resources and environmental degradation through legislation and budget allocation, the above problem alleviation is restricted by insufficient manpower and budget for arresting, preventing and rehabilitating. The problems of natural resources and environmental degradation have taken place in both rural and urban areas, showing that only government attempts would not be enough for problem alleviation. It is, therefore, necessary to provide incentives for promoting popular participation in alleviating natural resources and environmental problems at all levels. Problems should be solved in a continuous manner, so as to introduce a way of life, considered friendly to natural resources and the environment. As for rural development, the government should delegate administrative power for the local people to fully manage the local natural resources and environment (Atipho and Puangsamlee, 1985: 20-30).

Consequently, the government enforced the Act on Tambon Councils and Tambon Administrative Organizations 1994 (Royal Gazette, 1984; Chapter 53A), seen as an important step promoting the delegation of administrative power to the local areas and organizations. These are part of the empowerment process of local communities and people's organizations. The Tambon Administrative Organizations (TAO) will hold power and duties for development of the local economy, society and culture. For instance, they will be responsible for the maintenance of both land and

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water transportation routes, cleanliness maintenance, prevention and control of communicable diseases, disaster relief and prevention, educational provision, cares for children, women, the elderly and the handicapped, as well as protection and maintenance of natural resources and environment, etc. Regarding natural resources management, it is generally accepted that the local communities, as owner of natural resources, can be the best manager because members of local communities and community organizations hold proper understanding and learn about solving problems from the existing problems of natural resources. Hence, it is necessary to encourage local communities to propose natural resources development plan for their local areas (Lotrakul, cited in Homnet, 1985: 25). In the TAO, however, the Executive Committees of the TAO should play the major roles, as they hold direct responsibility for local management, especially the management of natural resources and environment in the local areas. As a consequence, they should possess good knowledge and understanding, together with skills and attitude for managing natural resources and environment, in order to successfully carry out policies and targets.

From the above necessities, the author is interested in studying the Roles of Executive Committee of Tambon Administrative Organizations in Kanchanaburi Province. Focus will be on how the Executive Committees play their roles in natural resources management, including factors related to their roles or operations, as well as problems and obstacles. The study results will be beneficial for guiding, promoting and improving the roles of the Executive Committees of the TAO in efficiently managing natural resources and the environment in many years to come.

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1.2 Objectives

1. To study the roles of the Executive Committees of the TAO in sustainable management of natural resources in Kanchanaburi Province.

2. To compare the roles of the Executive Committees of the TAO in Kanchanaburi Province with designated factors, i.e., genders, ages, occupations, educational levels, and training on natural resources management.

3. To study comments and additional recommendations on the roles of the Executive Committee of the TAO in sustainable management of natural resources.

1.3 Research questions

1. How do the Executive Committees of the TAO play their roles in sustainable management of natural resources?

2. What is the correlation directions between independent factors and the roles of the Executive Committees of the TAO in sustainable management of natural resources?

3. What are comments and recommendations to be raised by the Executive Committees of the TAO concerning their roles in sustainable management of natural resources?

1.4 Hypothesis

The Executive Committees of the TAO in Kanchanaburi Province, with different genders, ages, occupations, educational levels, and training on natural resources management, play different roles in natural resources management.

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Conceptual Framework

Independent Variables	Dependent Variables
- Genders	Roles in natural
- Ages	resources management
- Occupations	- forest
- Educational levels	- soil
- Training on natural	- wild life
resources management	- water
	- minerals

1.5 Scope of the study

The research is aimed at studying the roles of the Executive Committee of the TAO in Kanchanaburi Province with regard to sustainable management of natural resources, by gathering information form 52 TAOs, comprising 156 members of the Executive Committees.

1.6 Research variables

1. Independent variables include genders, ages, occupations, educational levels and training on natural resources management.

2. Dependent variables are the roles of the Executive Committees in natural resources management, concerning forest, soil, wild animals, water and minerals.

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1.7 Definitions of terms

The roles refer to behaviors under designated duties, rights and positions, which, in this research, covers the roles of the Executive Committees in sustainable management of natural resources in Kanchanaburi Province.

Tambon Administrative Organizations refer to a local administrative organization at a Tambon (sub-district) level, as a juristic person and local government unit, established under the Act on Tambon Councils and Tambon Administrative Organizations 1994.

The Executive Committees of the Tambon Administrative Organizations refer to a group of people holding management posts in Tambon Administrative Organizations. The Executive Committees comprise three members selected from members of the Tambon Administrative Organizations.

Sustainable management of natural resources refer to the management of works concerning uses, prevention, improvement, maintenance, and rehabilitation of natural resources. These will maintain the existence of natural resources, which can respond to the local needs on a continual and sustainable manner. In this research, natural resources include forest, soil, wild animals, water and minerals.

1.8 Significance of the study

1. To acknowledge the roles of Executive Committees of TAO in Kanchanaburi Province concerning sustainable management of natural resources.

2. To know basic information on problems and obstacles, as well as other opinions and recommendations regarding the roles of the Executive Committees of TAO in sustainable management of natural resources.

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3. To use study results as a guideline to develop, enhance and encourage the Executive Committees of the TAO to possess proper knowledge, capability, skills, experiences, and attitude for the efficient sustainable management of natural resources.

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CHAPTER II

LITERATURE REVIEW

To undertake the research on the Roles of the Executive Committee of the TAO in the Sustainable Natural Resources Management in Kanchanaburi Province, the author has reviewed literature with regard to related concepts, principles, and research papers, which can be summarized, as follows:

1. Sustainable development
2. Roles
3. Tambon Administrative Organizations
4. Current situation of natural resources in Kanchanaburi Province
5. Related research papers

2.1 Sustainable development

2.1.1 Definitions

Development is mainly involved with living conditions of people from past to present. It is a process to enable people to catch up with changes in different periods of time. Development can be conducted either by the people themselves, or by outsiders, i.e., the state and private sector. Through conducting development projects, there comes a new idea to solve people's problem a sustainable development concept, considered proper for long-term development now being of interest in global

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development community. The United Nations Fund for Population Activities (UNFPA, 1992: 3) defines sustainable development in four terms, namely:

1) Sustainable development refers to the development that meets the present needs, while responding to the needs and/or any necessity of the following generation. Any living standards that exceed minimum necessity can be sustained if consumption standards in every area take into consideration the long-term sustainability.

2) Sustainable development preserves natural resource inheritance for the following generation, at least at a comparable level inherited by the present generation.

3) Sustainable development evenly distributes fruitful benefits of economic prosperity, while protecting the environment both at local or general levels for the following generation. It is also the process that actually upgrades people's quality of life.

4) Sustainable development refers to improvement in quality of life of mankind within a livable eco-system.

In general, "sustainable development" is different from "sustainable growth" (Daly, cited in Wongboonsin, 1997: 71). "Growth" refers to physical expansion, while "development" covers quality changes, which are balanced and dynamic, without generating adverse effects on the environment or the eco-system. Hence, the target of development is just to seek proper ways to keep changes in the currently used resources at a minimal level, but able to effectively meet the needs of people (Wongboonsin, 1993: 6).

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Kosit Panpiemras (1993: 138) also defines "sustainable development" as an economic development that eradicates poverty, under the present ecological constraints so as to protect our planet for later generation. It is also a process, which will not ruin dignity of human beings, but maintain cultural diversities. Hence, sustainable development must pay considerable attention to the underprivileged groups of people in society, i.e., the poor, children and slum dwellers, etc.

Preecha Piempongsan (1991: 283) defines sustainable development as a process to improve quality of life and promote a proper way of living under the current capacity of the eco-system.

Defining sustainable development proper for the current context is Wiwatchai Atthakorn (1992: 39). He said, it is the development that recognizes people as the center of development. It must pay attention to freedom, friendship and dignity of human beings, as well as sound equilibrium between human beings and the environment. Sustainable development must lead to equal distribution of income and development benefits, and provide equal opportunity for people's participation in the thinking and implementing process. The benefits should be maintained with people, not only to participate in development activities, as designated by the government. Sustainable development is, therefore, a guideline to develop potential, conceptual thinking, values, and cultural dimensions in the long-run.

Corson (1990: 54) defines sustainable development as a policy that meets the needs of the present generation, without destroying resources to be needed by the future generation.

The World Commission on Environment and Development (1987, cited in P.A. Payutto, 1996: 57) states in its environmental publication, called "Our Common

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Future", that the development, focusing mainly on economic development but ruining the environment, is an imbalanced practice. It depletes natural resources and generates pollution, which also leads to demographic problems. The development, therefore, must focus on balance and sustain ability, implying that the economy is healthy with co-existence of the environment.

In conclusion, sustainable development can be defined as the process that responds to the needs of people, being aimed at creating the sustained and balanced benefits of people, the economy and the environment in the long run.

2.1.2 Sustainable Management of Natural Resources

At present, natural resources management under a sustainable approach is of interest both in Thailand and the whole world. The main target is to maintain long-term benefits of the environment. According to the World Commission on Environment and Development (Ibid., 1987), a main condition for sustainable management of natural resources is to promote economic development that enhances the environment. Development should co-exist with the environment.

For Turner (1993: 4), the natural resources management under a sustainable approach is the long-term utilization of natural resources, able to respond to the present needs, without causing problems to the next generation. Either, it should not cause degradation, shortage or pollution to the environment. Sustainable development of natural resources must comprise three main related parts, i.e., the environment, equality and future trend not to affect the environment. Most developing countries have sacrificed their abundant natural resources for national development to the level as in other developed states, eventually ending up with drastic effects on most parts of

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the country. All manufacturing or business activities must prudently consider worthwhile uses of resources. They should look ahead into the future, which requires a great deal of clear policies and plans (Welford, 1996: 4).

"Development not destruction" is a basic concept for sustainable development. In Thailand, for instance, the problem is seen in terms of quality of people. First of all, they should possess sound knowledge, understanding, social responsibility and recognition of benefits to be derived from sustainable development. Also seen as a major hurdle for introducing sustainable development in Thailand are the uncertain roles and policies of the government to support sustainable development practices for the benefits of the whole country (Rojanaburanon, et.al., 1991: 26-27). As a consequence, relevant parties should educate people at all ages concerning sustainable development practices. These include the top decision-makers in both public and private sectors. They should have enough information for decision making and attitude adjustment in order to recognize the invaluable benefits of natural endowments relative to economic benefits. Another problem in introducing sustainable development is that the local people's organizations still lack bargaining power to fully express their needs because there are different stakeholders in the national development process. Most of them still focus on their own benefits, instead of the utmost benefits of society as a whole.

Good and clearer evidence for the introduction of environmental systems in foreign countries is the regulations designated by the British Standards Institute. It describes environmental policies, as being consisted of organization, structure, responsibility, operational process and resources in order to assess policy implementation for the benefits of management. This policy framework is also in line

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with environmental management policies adopted in Ireland and Canada (Welford, 1996: 37). International Trade Organization and the Federal of Industries in England have designated key process of sustainable environmental management, as follows: (Gillbert cited by Welford, 1996: 37)

1) The policy that indicates an agreement on environmental improvement and protection of natural resources.

2) The planning process and list of activities for the given policy implementation both inside and outside the organization.

3) The continuous and systematic implementation of the plan within the organization on a daily basis.

4) Evaluation, examination and review of environmental management by responsible agencies, according to designated policies, operational plan and list of activities.

5) Training and education for better understanding toward environmental management of the organization.

6) Public relations activities and dissemination of information on the ongoing environmental management of the organization, which should be conducted as a cycle in order to show clearer policy and planning process, as in figure 1.

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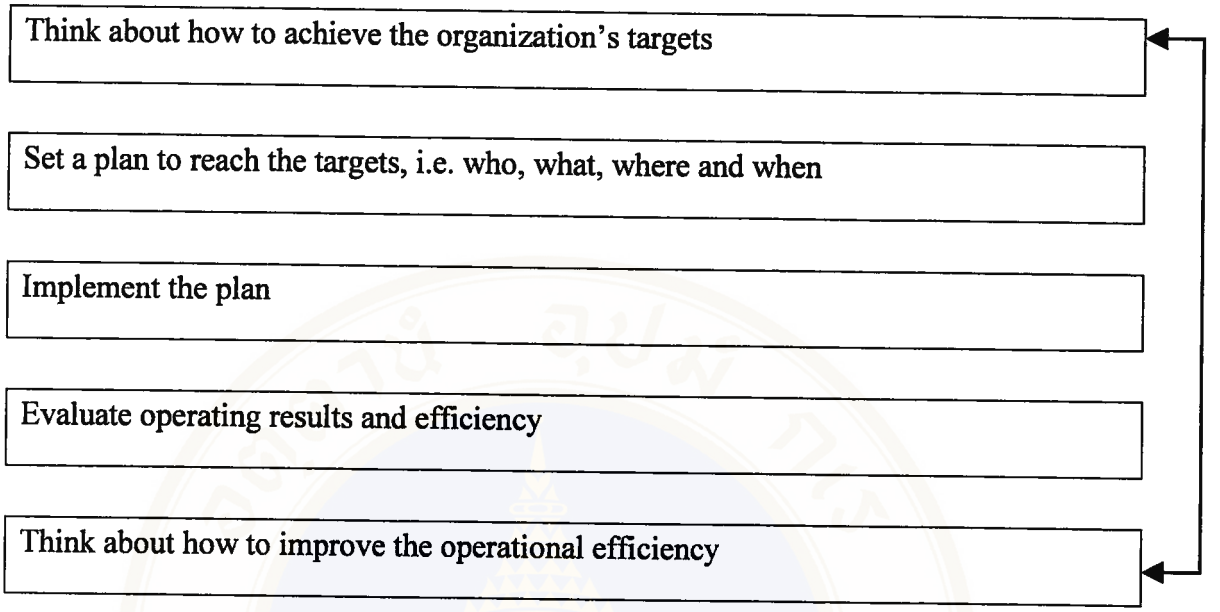

Figure 1 : Environmental Quality Management Cycle

All of the above mentioned concepts are inter-related, to maximize long-term benefits of resource allocation, and minimize lavish utilization of resources for individual benefits. Good examples should be cited and promoted continuously. The local people and communities should be encouraged to increasingly participate in brainstorming sessions to recognize problems, make decisions, implement, and closely monitor implementation results. Besides, due attention should be given to the volume of resources used, time constraints and implementation areas, so as to show that sustainable resources allocation can happen when all stakeholders recognize its value and understand the problems. These will lead to continuous and effective solutions to environmental problems. In order to ensure sustainable management of natural resources, people in an organization must pay attention to any adverse consequences to be arisen from resource uses. Contributory factors for sustainable

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management also includes sound management system, plan and policies, which should be clear among all parties concerned.

2.2 Roles

2.2.1 Definitions

Pattaya Saihu (1973: 80) defines roles as the exercise of designated rights and duties.

Phinyo Sathon (1973: 304) describes roles as other people's anticipations for actions likely to pursued by a person in a certain position. These include behaviors to be expressed in a certain situation. Roles should always co-exist with position held by a person.

Sucha and Surang Chan-em (1977: 46) say that roles are almost identical to status quo. Roles are actions to be taken by a person in different status. When society has designated rights and duties for a particular social status, a person in the said status should act, accordingly.

Supatra Suparp (1979: 58) describes roles as actions according to rights and duties under status (position). For instance, a father should play a role in upbringing their children, while teachers must teach children, etc. Roles also lead to effective behaviors of a person, and roles designate proper responsibilities to be pursued.

Anon Abhabhirom (1982: 54), on the other hand, summarizes roles as actions according to duties and positions held by a person. Therefore, roles are dynamic aspects or behaviors in certain positions.

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Princition, et.al. (1973: 260) describes roles as a course of actions or behaviors taken under responsible positions and anticipation of other related persons. Those actions must be consistent with opinions of the persons, from which the actions are expressed, and be related to other people.

Dressler and Willis (1976: 147-148) define roles as behaviors of a person anticipated by other people, or the so-called anticipated roles, so behaviors should be expressed in response to anticipated roles. These are the roles actually pursued by a person. The actual roles may be either totally or intotally complete as earlier anticipated.

Cohen (1979: 35-36) defines roles as a course of behaviors anticipated by others. A person holding a position must carry out his/her designated duties. When a society designates a person to perform any function, we will call it as a designated role. Although the person does not perform the role as expected by others, we should accept that the person still perform the role as designated by society. The actual role, however, is the way the person expresses his/herself according to his/her position. The difference between the designated and actual role may stem from misunderstanding about a desirable role of the person his/herself. In addition, it may stem from disagreement with designated role, or inability of the person to effectively follow his/her designated role.

In summary, roles refer to a course of behaviors expressed by a person according to his/her designated duties or positions. His/her roles will designate responsibilities. In this research, the roles refer to the roles of the Executive Committees of TAO in natural resources management.

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2.2.2 Types of Roles

Given the complicated social structure at present, an individual will have different roles or social status. Titaya Suwannachot (1967: 9-10) defines roles as behaviors designated by social status and positions, which can be divided into ideal and actual roles, as follows:

1) Ideal role shows what should be done by a person holding a social status, such as a father shall raise and educate his children.

2) Actual role shows what needs to be done by a person holding a social status. For instance, parents show verbal expressions or give gifts to their beloved kids. Actual roles are just the ways people apply their ideal roles to the actual situation, which is the combination of ideal roles, compatible with personality of those holding a social status, emotions, existing tools, and reactions of related persons.

Aroon Raktham (1983: 18) describes roles of managerial psychology in three aspects, comprising:

1) Actual role or role behavior is the role or behavior actually taken by a person. Basically, it is controlled by emotion, attitude, personal behavior or problems in workplace, etc.

2) Role prescription refers to scope of responsibility, designated by an organization or agency, which should be followed in order to avoid problems.

3) Role expectation can be divided into expectation by others or by oneself. Problems usually arise when a person cannot fulfill, or perform his/her roles, as expected.

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Sa-nguansri Wiratchai (1984: 23-24) points out that, if we deeply consider social roles, we can define roles in various aspects, namely:

1) Prescribed role refers to a role designated by a society, a group or an organization concerning behaviors for certain social positions. For instance, government officials must comply with right directives of the superiors, etc.

2) Expected role is a course of actions anticipated by others to be performed by a person holding a particular position, which is usually in line with designated roles.

3) Subjective role refers to a course of actions, which the person holding a position see as proper roles for the said position. Those roles can be either consistent or inconsistent with designated roles, or with anticipated roles.

4) Enacted role refers to behaviors taken by the person in a particular position, which usually coincides with ideal roles of that person.

5) Perceived role refers to a course of actions acknowledged by others, according to the role for a particular position. By nature, human beings will choose to acknowledge, which may be deviated from the actual situation, as influenced by personal experiences and situations.

Broom and Selznick (1973: 34) categorize roles in three aspects, namely:

1) Ideal role is the role, of which the rights and duties are stated on a written document, or legalized, or regulated.

2) Performed role is what is actually performed by a person, based on belief, anticipation, perception and experience of a person holding a particular position. Due

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attention, however, should be given to pressures, constraints and opportunities in society within a given period of time.

3) Perceived role is what a person holding a position believes in and hope to pursue in order to carry out designated duties, but not yet to be included in the position. It may differ from an ideal role (not to be regulated or legalized), and a performed role. The perceived role will rely on an organization, thinking, experience and perception of an individual holding a particular position.

Berlo (1979: 35-36) summarizes roles, as follows:

1) Role perception is clearly regulated regarding the role a person should pursue when holding a position.

2) Role description is what should be done actually, when holding a position.

3) Role expectation is what is anticipated by others when a person is to hold a position.

Benne and Sheats (cited in Owens, 1987: 66-67) describe that a group of people possess three major roles, i.e.,

1) Group task roles will enable a group to select problems to be solved by the group, in order to explain and seek proper solutions.

2) Group building and maintenance role will enhance group development, and maintain its status.

3) Individual roles will enable each group member to respond to an individual or a group need.

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In this regard, roles can be concluded in three aspects, (1) Prescribed role to be pursued by a person in a particular position; (2) Expected role by others for a person to take his/her roles while holding a position; and (3) Actual role refers to the role to taken by a person so as to carry out assignments.

2.2.3 Problems in Role Expressions

Pha-ob Namart (1983: 43) summarizes problems related to roles in three aspects, namely:

1) Role impairment: A person cannot take a role, despite being clearly and definitely designated. The person feels it difficult or unable to take the role. Some may be specialized in that role, likely to cause damage, serious harms, or drastic effects on other people.

2) Role confusion refers to the case that a person is capable to take the role, but there is a problem regarding the role-setting process in society. There may be unclear definitions, or conflicts between designated and social roles. For instance, a person may be confused with the fact, either to choose love or marriage.

3) Role violation and other role refer to a person unwilling to take his/her legitimate role, but choose to obey the plan. These behaviors are, for instance, crimes and narcotic trading, etc. The person will perform the duties, which contradict social norms, which will eventually generate social problems.

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2.3 Tambon administrative organizations

2.3.1 Tambon Administrative Organizations in the past

The first Tambon Administrative Organization was established by the government led by Field Marshal Phlaek Piboolsongkhram. The government issued the Tambon Administrative Organization Regulations 1956, which came into effect on January 17, 1957. About 59 Tambon Administrative Organizations were established as juristic persons.

Main points of the Tambon Administrative Regulations 1956, can be summarized, as follows:

There shall be the Tambon Administrative Organizations to run Tambon-related affairs. The administrative zone shall be in line with each Tambon territory according to the law governing local administration. It shall hold a juristic person status, comprising the Tambon Council and Tambon Committee.

The Tambon Council shall consist of members elected by villagers, each of which will represent each village. All Kamnan and village headmen within each Tambon shall be ex-officio members, responsible for overseeing management of the Tambon Committee.

The Tambon Committee shall consist of Kamnan in the local areas to act as Chairman. Physicians positioned at the Tambon and all village headmen in the Tambon are members. These include other members to be appointed by District Director, by selecting from principals of schools within the Tambon and experts by not more than five persons, in order to oversee and share responsibility in Tambon administration, as shown in figure 2:

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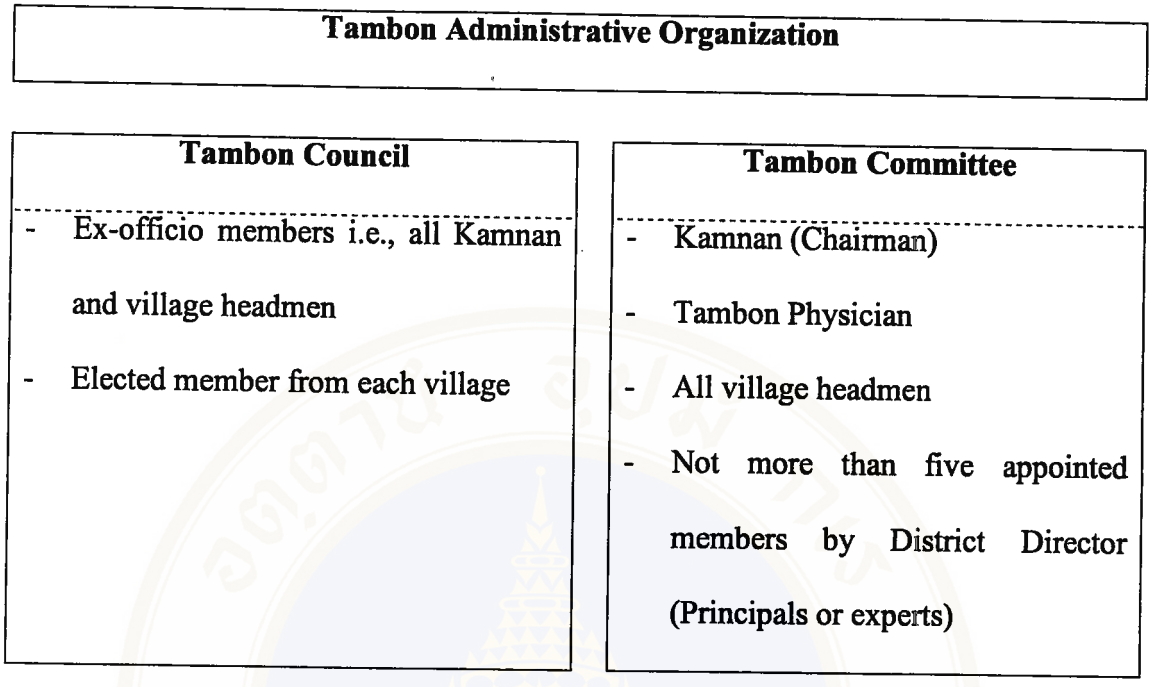

Figure 2 : Tambon Administrative Structure under the Tambon Administration Act 1956

Later, the Ministry of Interior rescinded the Interior Ministry's directive No. 222/1956, dated March 1, 1956, set up the Village and Tambon Development Committee 1966, and issued the Interior Ministry's directive No. 275/1966, dated March 1, 1966, concerning the Tambon and Village Administrative Regulations. These were aimed at rearranging the Tambon Administrative Regulations so that the Tambon Council could function more effectively, compatible with the actual situation during that period. A new pattern of the Tambon Council was set up, in line with the Democratic Citizen Development Project (DCDP), by improving the Tambon Administration, similar to a local council under in democratic regime. It was still holding a juristic person status. The rearrangement took place, due to the greater and continuous call for democracy by people. However, the newly-established Tambon

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Council could not be established all over the country, due to budget constraints. Until the year before 1972, there were only 1,509 new Tambon Councils established under the directive No. 275/1966, including approximately 3,100 Tambon Councils established under the directive No. 22/1956, and 59 Tambon Administrative Organizations.

Then, there was the Revolutionary Council Announcement No. 326, dated December 13, 1972, demanding the establishment of the new Tambon Council only, to be accomplished all over the country within 3 years, as shown in figure 3:

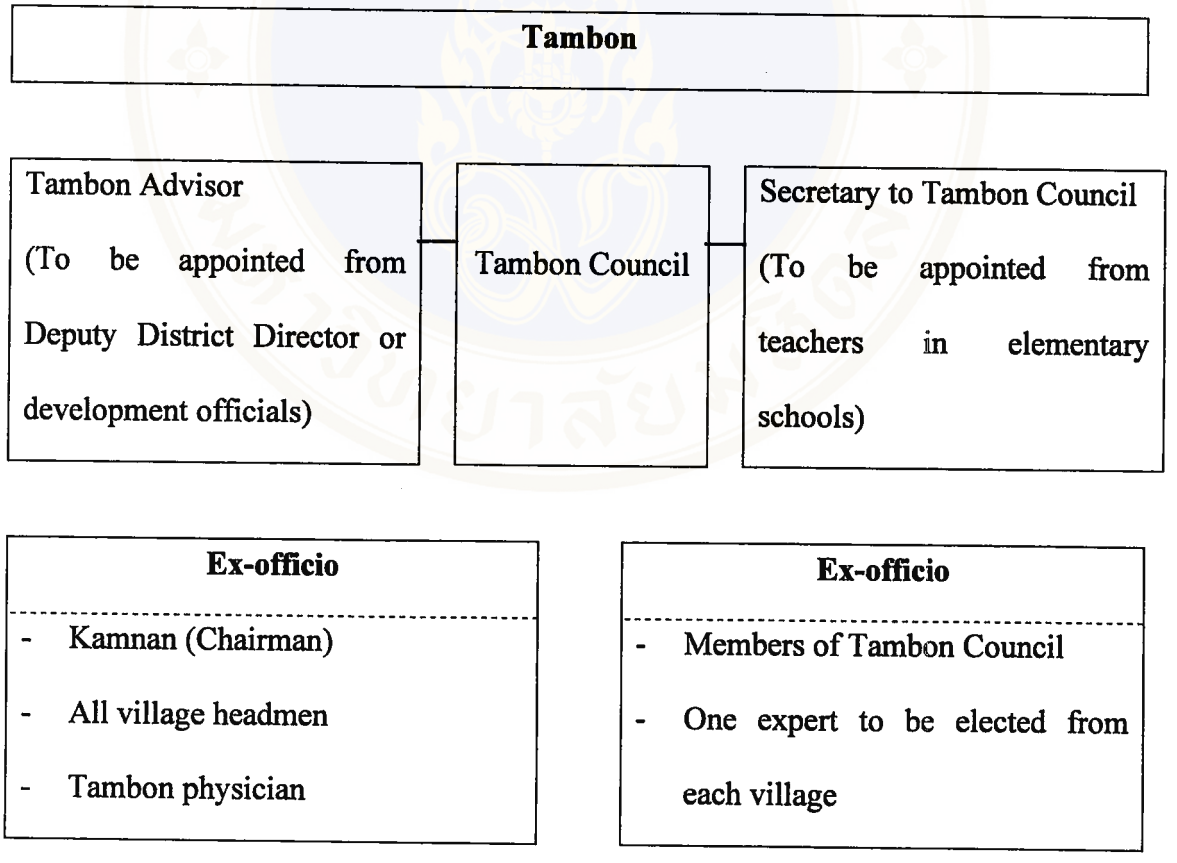

Figure 3 : Tambon Administrative Council Structure under the Revolutionary Council Announcement No. 326, dated December 15, 1972

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The Tambon Council, established under the above Revolutionary Council Announcement, consisted of Kamnan in local areas as Chairman, together with ex-officio members comprising all village headmen, and Tambon Physician. These included one expert to be elected from each village, together with one advisor, either Deputy District Director or development officials, to be appointed by District Director. One secretary was appointed by the District Director, by selecting from teachers in the local elementary school. All were to be reported to Provincial Governor for official appointment.

2.3.2 Present Tambon Administrative Organization

Based on the Tambon administrative structure as earlier enumerated, it is evident that the Tambon Administrative Organizations were faced with problems in terms of readiness in various aspects. For instance, they lacked their own income and capable staffs. This is due to the fact that there was no tax base in the local areas, while the local development tax collection was just minimal. Most of their local staffs were constrained with management capability, especially in terms of budgeting etc. Therefore, the Tambon Administrative Organizations were abolished by the Revolutionary Council Announcement No.326, dated December 13, 1992. Since then, Thailand lacked a local administrative unit at a Tambon level until 1992, when the government under the Prime Minister Chuan Leekpai Administration has developed a political policy to promote a local administrative unit at the Tambon level. It will hold a position as a juristic person, for greater flexibility more efficiency in solving local problems.

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The government, then, has promulgated the Tambon Council and Tambon Administrative Organization Act 1994, being effective from March 2, 1995 (Arunakasikorn, et.al., 1996). Main points follow:

- The Revolutionary Council Announcement No.326 shall be rescinded.

- The Tambon Council shall hold a position as a juristic person, consisting of Kamnan, all village headman in a Tambon, Tambon physician, and two members elected from each village, as members.

Any Tambon Councils, having received budget allocation by no less than 150,000 baht a year during the last three years, shall be promoted as **"Tambon Administrative Organizations"**, holding a juristic person position and a government agency, as shown in figure 4:

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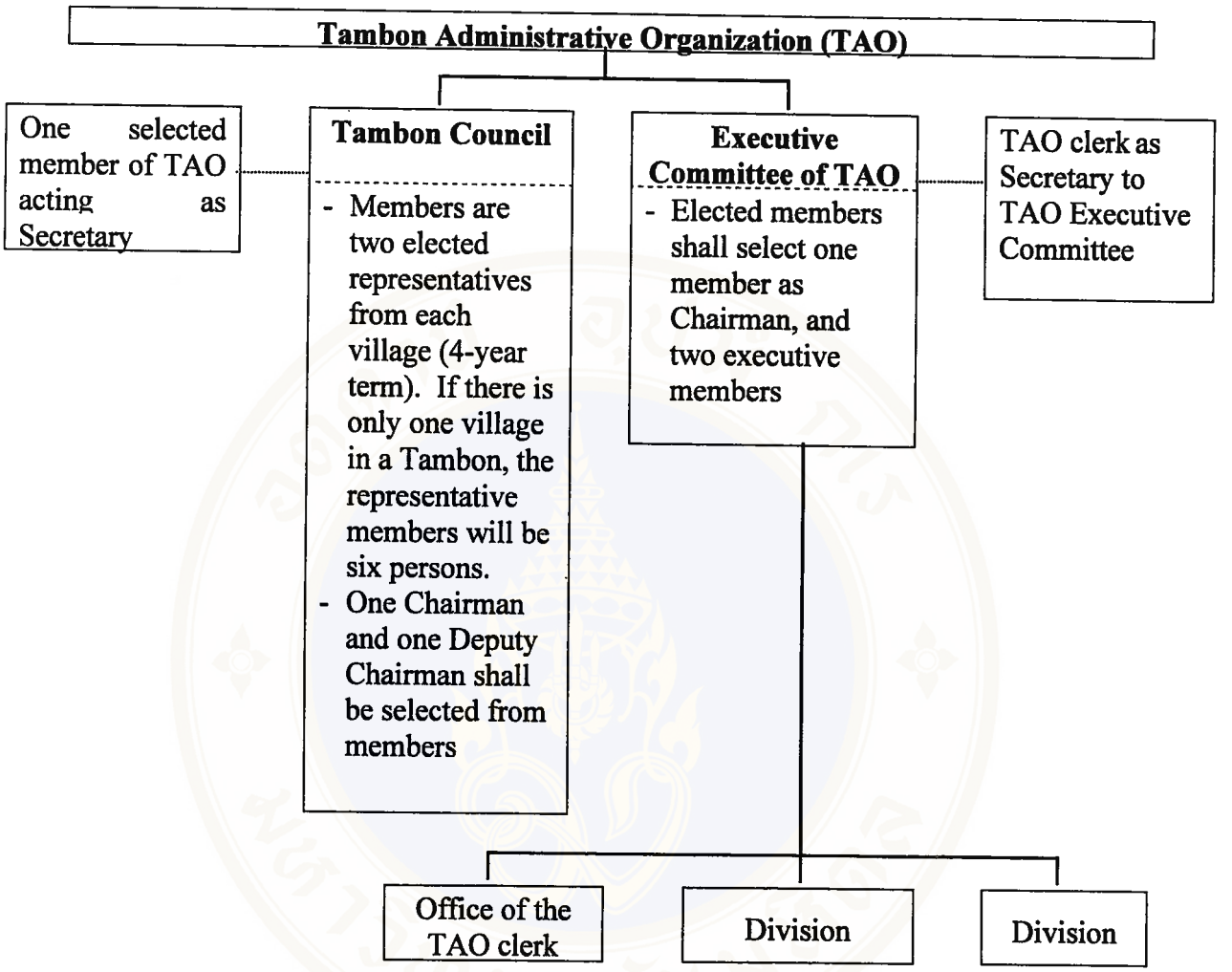

Figure 4 : Tambon Administrative Organization Structure under the Tambon Council and Tambon Administrative Organization Act 1994, and the Amendment 1998

As prescribed under the Tambon Council and Tambon Administrative Organization 1994, 617 Tambon Administrative Organizations were established in 1995, 2, 143 established in 1996, and 3,637 established in 1997, thus equal to the total amount of 6,397 Tambon Administrative Organizations. There were 567 remained in the establishment pipeline.

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Adopting the present Tambon Administrative Organization Structure, the government has improved several shortfalls from its previous attempts. Government agencies in regional areas have been encouraged to adjust their roles from supervisors to facilitators for local agencies. In addition, the fiscal and administrative power has been delegated to the Tambon Administrative Organizations to provide sufficient revenue for local agencies.

2.3.3 Tambon Administrative Organization (TAO) Structure

As a local government agency in a position as a juristic person, the Tambon Administrative Organization (TAO) consists of the Tambon Council, and the Executive Committee of TAO

1) Tambon Council

The Tambon Council takes a legislative role. It consists of representative members, i.e., two members elected from each village in the Tambon territory. If there is only one village in the territory, there will be six TAO members, altogether.

2) TAO Executive Committee

There are three members in the TAO Executive Committee, appointed by the District Director under advice of the Tambon Council. Its members comprise:

1. One Executive Chairman
2. Two Executive Members

TAO clerk shall act as secretary to the TAO Executive Committee.

There is an exception stated in the final paragraph of Provisional Clause, Article 95, stipulating that, from the effective date of this Act, the second paragraph of Article 58 shall not be enforced. This is to prohibit the Executive Committee to select a member as Chairman of the Executive Committee, but Kamnan shall be ex-

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officio Chairman of the Executive Committee. During the first four years of the TAO establishment, Kamnan will be ex-officio Chairman of the TAO Executive Committee.

2.3.4 Authority and Duties

Authority and duties of the Tambon Council are, as follows (Puang-Ngam, 1999: 174) :

(1) To approve the Tambon Development Plan, as a guideline for managing TAO activities.

(2) To screen and approve Tambon regulations, the draft annual budget regulations, and the draft expenditure budget regulations.

(3) To supervise administration of the TAO Executive Committee, compatible with the Tambon Development Policies and Plan (1), and the laws, and regulations.

2.3.5 Authority and Duties of TAO Executive Committees

Authority and duties of the TAO Executive Committees (Yawaprapat, 1997: 44) are, as follows:

(1) Manage TAO activities, in accordance with resolutions, regulations and the Tambon Development Plan, and take responsibility for TAO activity administration, to be further reported to the Tambon Council.

(2) To formulate the annual Tambon Development Plan and the annual expenditure, to be submitted to the Tambon Council for approval.

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(3) To report operational results and budget spending to the Tambon Council, at least twice a year.

(4) To perform other functions to be assigned by the government.

2.3.6 TAO Authority and Duties

A. The TAO shall have the duties to develop Tambon's economy, society and culture in accordance with Article 66 (Department of Local Administration, 1996: 13-14).

B. Legitimate duties of the TAO under Article 67 are, namely:

(1) To provide and maintain water and road transportation routes.

(2) To maintain cleanliness of roads, water routes, pavements, and public areas, as well as to dispose of garbage

(3) To prevent and control communicable diseases

(4) To prevent and relieve disasters

(5) To promote education and culture

(6) To promote the development of women, children, the youth, the elderly and the handicapped

(7) To protect, care for and maintain natural resources and environment

(8) To perform any other functions to be assigned by the government

C. TAO authority and duties under Article 68 are, as follows:

(1) To provide water for consumption and agriculture

(2) To provide electricity or other forms of lighting

(3) To provide and maintain drainage system

(4) To provide and maintain places for meeting, sports, recreation and public parks.

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(5) To provide and promote farmers groups and cooperatives

(6) To promote cottage industries

(7) To maintain and promote people's occupations

(8) To protect and maintain public properties

(9) To reap benefits from TAO's assets

(10) To provide market, piers and boarding

(11) To provide places for commercial activities

2.3.7 Scope of TAO Duties

The TAO has been established under the Tambon Council and the Tambon Administrative Organization Act 1994, holding the duties to promote economic, social and cultural development. The law also delegates more duties and authority to TAO than that of the Tambon Council, especially legitimate and eligible duties, similar to that of the municipalities. Hence, to perform legitimate duties, the TAO possesses greater freedom and flexibility to issue regulations and enforce any designated operations than the Tambon Council. The TAO can perform its designated authority and duties, as follows:

(A) Issue of Regulations

The TAO can issue any regulations for enforcement within its territory, which do not contradict the law or its legitimate power. These include the setting of duty and fine against those violating the regulations, but not to exceed 500 baht as stated by law.

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The TAO can submit the draft Tambon regulations under approval of the Executive Committee or Tambon Council, and then the District Director. After that, by law, Chairman of the Tambon Executive Committee shall sign the regulations for further imposition.

In case of District Director's disapproval of any draft regulations, the law stipulates that the District Director return the draft regulations to the Tambon Council within 15 days, form the date of receipt of the draft regulations by the District Director. The Tambon Council will have to reconsider the draft. If there is a fine for any violation stated therein, the draft, as disapproved by the District Director, will become ineffective.

In case that the Tambon Council reviews the draft regulations returned by the District Director, but not less than two-thirds of the existing members of the Tambon Council resolve to enforce the draft regulations, Chairman of the Executive Committee of the TAO shall have the power, by law, to sign and effect the Tambon regulations, without prior approval of the District Director. Unless the Tambon Council confirms its resolution within 30 days from the date of receipt of the draft regulations from the District Director, the draft Tambon regulations shall be rescinded.

(B) Request for Government Information

In order to perform its legitimate functions, the TAO shall have the right to obtain government information related to its activities. Exception is for any confidential information related to national security.

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Another important point is that, although the TAO, as a juristic person, is entitled for the development of its economy, society and culture, any central ministries and departments still have power and duties to carry out any activities for the benefits of the local people. These central agencies will just inform the TAO in advance of any operations to be taken, as deemed appropriate. If the TAO is to raise any opinions with regard to the said operations, the law stipulates that those opinions be considered by those agencies whenever delivering their development projects.

(C) Undertaking of any joint activities with other local agencies

To undertake any activities for the benefits of a Tambon, the TAO may have to cooperate with other local agencies, i.e., other TAO, Tambon Council, Provincial Administrative Organization (PAO), or any other local government units, but under their consent, or any other agencies involved with the said TAO activities.

2.3.8 TAO Revenue

A. Legitimate revenue (Yingworapan, 1999, 44-47)

(1) Local development tax, land and property tax, signboard tax, slaughtering duties, and any other benefits from slaughtering in a Tambon territory.

(2) Taxes and duties imposed on automobile and wheels collected in a province: By law, those taxes and duties shall be allocated to the TAO within the Province, according to the law governing such issues.

(3) Additional taxes and duties to be collected by the TAO by not exceeding 10 percent of any of the following taxes and duties:

1) Specific business taxes under the Revenue Code, imposed on any business enterprises located in a TAO territory.

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2) Duties on sales of liquor, as stipulated by law collected from liquor stores located in a TAO territory.

3) Duties on gambling permitted by laws, collected from gambling houses located in a TAO territory.

An amount of payments of those taxes and duties, which exceeds one baht, shall be eliminated.

The above taxes and duties, as earlier mentioned, shall be as stipulated by laws governing particularly taxes and duties.

(4) Taxes as stipulated by law governing bird's nest collection, taxes stipulated by law governing artesian wells, duties on concessions, licenses, and license under the Fishery Law, royalty fees and duties under the laws on forestry, and duties collected from ownership right registration and any legal acts under the Land Code. By law, any duties collected in any TAO territory shall go to a respective local authority.

(5) Royalty fees on minerals as stipulated by laws on minerals, and royalty fees on petroleum under the laws on petroleum. Those collected fees shall be allocated to the TAO, according the criteria and methodologies stated in ministerial regulations.

(6) Fees collected by laws from any national parks: Those fees shall be allocated to a respective TAO under the criteria and methodologies stated in ministerial regulations.

(7) The laws also enable the TAO to collect value-added taxes, by setting as an extra amount of VAT to be collected according the Revenue Code, as follows:

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1) In case the Revenue Code stipulates VAT collection at a zero level, the TAO shall set its taxes at a zero level too.

2) In case the Revenue Code stipulates VAT collect at other levels, the TAO shall collect one out of nine of VAT collected under the Revenue Code.

The additional amount of VAT collected under Item (7) shall be categorized as VAT under the Revenue Code.

In this regard, a TAO may assign any ministries or departments responsible for particular taxes or duties collection to collect taxes or duties on its behalf. In this case, all tax and duty revenues, after expenses as stipulated under ministerial regulations, shall be delivered to the TAO.

B. Revenues to be allocated to the TAO include the followings:

(1) Income from TAO properties

(2) Income from TAO public facilities

(3) Income from TAO commercial activities

(4) Duties, license fees and fines as stipulated by law

(5) Other donated money and properties

(6) Other incomes allocated from other government units

(7) Government subsidies

(8) Other incomes stated by law as TAO's income

(9) Loans borrowed by the TAO from ministries, departments, organizations or any other juristic persons, under prior approval from Tambon Council, and in accordance with the Interior Ministerial Regulations.

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Those legitimate incomes are exempted from tax payments, under a Royal Executive Decree under the Revenue Code.

Expenditures

TAO's expenditures include:

(1) Salary

(2) Wages

(3) Other remuneration

(4) Miscellany

(5) Material expenses

(6) Equipment

(7) Land, buildings and other properties

(8) Facilities

(9) Government subsidies

(10) Other contingent expenses, stipulated by laws or the Interior Ministerial Regulations

(11) Remuneration for Chairman of the Executive Committee, members of Tambon Council, secretary to Tambon Council, members of the Executive Committee, and secretary to the Executive Committee, as stipulated under the Interior Ministerial Regulations.

2.4 Natural resources situation in Kanchanaburi Province

Kanchanaburi Province is located in Central Thailand, about 129 kilometers to the West of Bangkok. It covers the total areas of 19,483,148 square kilometers, or about 12,176,967.5 rai, the third largest province of the country, after Nakhon

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Ratchasima and Chiang Mai. It borders to Myanmar, of about 370 km long. Its adjoining areas are, namely:

North Tak and Uthai Thani Provinces

South Ratchaburi Province

East Suphan Buri and Nakhon Pathom Provinces

West Myanmar

Landscape

1. Mountains and high lands are in the northern part in Sangkhla Buri District, Thong Pha Phum District, Si Sawat District and Sai Yok District. They are mostly ridges in continuation from the Thanon Thongchai Mountain Range, lying to the West of the Tanaosi Mountain Range, natural border line between Thailand and Myanmar. These stretch to the South. They originate two major main river lines of the Province: Khwai Yai and Khwai Noi.

2. Runnel Plain is in northeastern part of the province, comprising slopes and hills in Lao Khwan District, Bo Phloi District, and Phanom Thuan District.

3. Alluvial plain is in the south of the Province. Fertile plain is in Tha Maka of Tha Muang district, part of Phanom Thuan District, and Muang Kanchanaburi District.

1) Natural Resources

1.1 Forest: Total forest areas in Kanchanaburi are 7,226, 250 rai, or about 59.34 percent of the total provincial areas, which were markedly reduced to 6,713,750 rai in 1993, equal to 55.13 percent of the total provincial areas. Most of the forest

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areas are covered by tropical forest. There are 15 national forest reserves and five national parks in the Province, comprising the Erawan National Park, the Sri Nakharin Dam National Park, Sai Yok National Park, the Rattanakosin Bicentennial National Park, and the Khao Laem National Park. These include one park at Phra Taen Dong Rung, and two wild-life sanctuaries, i.e., Salak Phra and Tung Yai Naresuan Wild-life Sanctuaries. There are three no-hunting areas in Sri Nakharin Commemorial Park, Pha Bung Krueng Ka Via and Nong Nam Sap, and La Wa and Dao Dung Caves.

Table 1 : National Forest Reserves, Wild-Life Sanctuaries, and National Parks in Kanchanaburi Province

List	District	Total Areas (Rai)
A. 15 National Forest Reserves		
1. Nong Rong	Phanom Thuan	19,375
2. Don Salaeb-Lao Khwan	Lao Khwan	337,500
3. Wang Yai – Noi River	Sai Yok – Thong Pha Phum	996,418
4. Eastern Insri Pass	Phanom Thuan	37,500
5. Huay Khayeng	Thong Pha Phum, Sai Yok	376,320
6. Khao Salang Phan	Phanom Thuan	1,040
7. Khao Chang Phuek	Sangkhla Buri	1,085,977
8. Phra Taen Dong Rung	Tha Maka	1,344
9. Khao Phra Rusi – Bo Rae First Plot	Sangkhla Buri, Thong Pha Phum, Sai Yok	542,500
10. Khao Phra Rusi - Bo Rae Second Plot	Si Sawat, Bo Phloi	750,000
11. Sixth Forest Plot of Thai Paper Mill	Si Sawat	101,562
12. Khao Ta Lamo	Si Sawat	6,781
13. Nong Ri	Si Sawat, Bo Phloi	272,187
14. Nam Chon	Thong Pha Phum	472,706
15. Chat Yai – Khao Sung	Muang, Tha Muang	13,725
B. Two Wild-Life Sanctuaries		
1. Pha Salak Phra	Muang, Bo Phloi, Si Sawat	536,594
2. Tung Yai Naresuan	Sangkhla Buri	1,470,000
C. Five National Parks		
1. Erawan	Muang, Si Sawat, Sai Yok	343,750
2. Sri Nakharin	Si Sawat, Sai Yok, Thong Pha Phum	957,500

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List	District	Total Areas (Rai)
3. Sai Yok	Sai Yok	312,500
4. Rattanakosin Bicentennial	Si Sawat	36,875
5. Khao Laem	Thong Pha Phum, Sangkhla Buri	935,625

Source: Kanchanaburi Provincial Forestry Office, the Royal Forestry Department: 1997

The above data show that three-fourths of the total provincial areas are forest, mostly tropical and rain forest. The Tung Yai Naresuan Wild-Life Sanctuary has been proclaimed as a World Heritage Site by the Inter-government Commission, in order to protect cultural and natural heritages of the world. Its significance can be summarized, as follows:

It is the largest forest area of Thailand and Southeast Asian Region. It encompasses a wide variety of plants and animals, including wild insects. The recent survey showed that over 33 percent of wild mammals are found in mainland of Southeast Asia. Over 45 species of wild life, are endangered on domestic scale, 15 species are endangered on regional scale, and three species are fauna. A long stretch of forest helps secure the existence of both plants and animals, very vital to balance in the eco-system, control and relieve of natural disaster, soil fertility, water and fresh air.

The World Heritage Site Criteria are, as follows:

1. Clear evidence for ancient.

2. Examples of geological and ecological evolutions of the world.

3. Natural beauties.

4. Natural habitats of rare plants and animals of the world.

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Meeting with Items 2, 3 and 4 of the above criteria, the Tung Yai Naresuan has been proclaimed as a World Heritage site.

1.2 Water: Natural sources of water in Kanchanaburi are rivers, canals, swamps and natural swamps, i.e.:

1. Khwai Noi River originates as small streams on a mountain in Sangkhla Buri and Thong Pha Phum Districts. There comprise three major streams, i.e., Bee Khli, Rantee and Songalia, which adjoin in an area, called "Sam Sob", to the North of Sangkhla Buri District. The Khwai Noi River, of about 250 km long, stretches across Sangkhla Buri, Thong Pha Phum, Sai Yok, Muang Districts, and meet with the Khwai Yai River at Tambon Phak Phraek, ahead of Kanchanaburi, before turning as the Mae Khlong River. A major branch of the Khwai Noi River is called Lam Phachi, running through the Tanaosri Mountain Range, and Chom Bung District of Ratchaburi Province. This is another beautiful riverine in Thailand, stretching across beautiful landscape. The famous "Sai Yok" waterfalls is part of this river. This includes fountains and islets along the river.

2. The Khwai Yai River originates from a mountain, part of the Thanon Thongchai Mountain Range in Um Phang District of Tak Province. It is 450 km long, running across Thong Pha Phum, Si Sawat and Muang Districts, before adjoining the Khwai Noi River and becoming the Mae Khlong River. There comprise two main branches; Huay Kha Khaeng and Lam Tapoen. The Khwai Yai River runs through mountains and forest areas. One of the most famous waterfalls is called Erawan. Also, there are many fountains and islets along the river.

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3. The Mae Khlong River begins from the adjoining areas of the Khwai Yai and Khwai Noi River at Tambon Phak Phraek of Muang District. It is one of the main river lines in Thailand, of about 140 km long, running through Muang, Tha Muang and Tha Maka Districts of Kanchanaburi Province, entering Ratchaburi Province, and then the Gulf of Thailand at Samut Songkram Province.

Water pollution of the Khwai and Mae Khlong Rivers is aggravating, due to drainage and garbage from rafts and guesthouses along the rivers, either directly or indirectly. Moreover, rafts are mostly tied untidily, resulting in fluctuation in water flows, and accumulation of garbage in certain areas nearby the city, and the river will become more shallow, sooner or later.

1.3 Minerals: There are 72 mines operated under government concessions in Kanchanaburi, employing no less than 1,856 workers. The government earned royalty fees and duties, totaling 12,703,463 baht, up from 1994 by 2,527,130 baht, or 24.83 percent. Important minerals are lead and kaolin, with total production volume of 22,786 and 34,595 metric tons, worth 147,998 and 33,211 million baht, the highest and the third of the country respectively. Other minerals are fluoride, kaolin, antimony, tin and dilomite, etc. Details are as in Table 2.

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Table 2: Minerals Found in Kanchanaburi

Minerals	Sources
1. Tin	Tambon Ban Kao, Muang District Tambon Lin Thin and Tambon Pilok, Thong Pha Phum District Tambon Wang Kra Jae and Tambon Si Mongol, Sai Yok District Tambon Nong Ri, Bo Phloi District
2. Wolfram	Tambon Lin Thin and Tambon Pilok, Thong Pha Phum District Tambon Wang Kra Jae, Sai Yok District
3. Scheelite	Tambon Pilok, Thong Pha Phum District Tambon Liwo, Sangkhla Buri District
4. Lead, Silver and Zinc	Tambon Liwo, Sangkhla Buri District
5. Antimony	Tambon Phrang Ple and Tambon Liwo, Sangkhla Buri District
6. Fluoride	Tambon Huay Krachao, Huay Krachao Sub-district Tambon Bong Ti, Sai Yok District Tambon Jorakhae Phuek, Muang Kanchanaburi District
7. Chromite	Tambon Wang Dung and Tambon Phak Phraek, Muang District Tambon Khao Noi, Tha Muang District
8. Phosphate	Tambon Klon Do, Dan Makham Thia District
9. Kaolin	Tambon Klondo, Dan Makham Thia District
10. Felspar	Tambon Nong Ri, Bo Phloi District
11. Granite	Tambon Phang Ple, Songkhla Buri District
12. Lime Stone	Tambon Nong Chok, Tha Muang District
13. Precious stones	Bo Ploi District

1.4 Soil: In 1993, total areas of Kanchanaburi are 12,176,968 rai. About 54 percent, or 6,713,907 rai, are forest areas, 2,058,134 rai (16.90 percent) are farm areas, and the unclassifiable areas of 3,404,927 rai (27.96 percent).

As for occupation of farm areas, most of them, or 1,637,312rai (79.55 percent), are under farmers' ownership. Of these, 1,537,460 rai (74.70 percent) are under complete ownership of farmers (not under bank mortgages), 99,852 rai (4.85 percent) mortgaged, and 420,822 rai (20.45 percent) under ownership of landlords. Of about 284,133 rai (13.81 percent) are rented farmlands.

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With regard to ownership document issue, 1,398,736 rai (11.49 percent of the total provincial areas) have been granted with ownership documents. Approximately 178,114 rai (12.74 percent) are under land title deeds, and 1,220,595 rai (87.26 percent) under land certificates or land occupancy documents.

Kanchanaburi has lost its forest areas through the construction of three major hydroelectric dams in the Province, i.e. Sri Nakharin, Tha Tung Na and Khao Laem Dams, covering the vast areas of 585,420.06 rai. These exclude the Vachiralongkorn Irrigation Dam. Those three dams cover the total areas of 468,125 rai, out of the total provincial areas of 12,176,967 rai, or no less than 4 percent. When compared with the total farm land of only 1,578,643.70 rai, no less than one-third is now under water.

2) Natural Resource and Environmental Problems

1.1 Deforestation (Kanchanaburi Provincial Forestry Office, 1997)

1.Illegal logging stems mainly from capitalists, merchants, owners of saw mill and wood-processing plants, concessionaires, and the villagers themselves. There are now both legal and illegal logging in the province, in line with demand for housing, farming tools, and household requirement, etc.

2.Encroachment into forest areas is increasingly taking place, both for farming and speculation.

3.Large investment projects of the government are, such as the construction of dams, roads and natural gas pipelines from Myanmar, etc.

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Solutions

1. There should be measures to control, prevent and suppress illegal logging on a more intensive and continuous manner.

2. Relevant parties should launch public relations campaigns to create public awareness of natural resources conservation. There shall be village volunteers to help keep and protect forest areas.

3. The government shall promote reafforestation projects to honor the royal family or any involved agencies.

1.2 Wastewater

As mentioned earlier, there are three main rivers in this province, i.e., Khwai Yai, Khwai Noi and Mae Khlong. Water quality in these rivers is deteriorating, due partly to rafts, restaurants, guesthouses, and factories for releasing untreated wastewater into public waterways.

Solutions

1. There shall be a general wastewater treatment system, especially wastewater from communities. Wastewater treatment plants shall be constructed in municipal areas, sanitary districts, factories, hotels, and guesthouses, etc. In FY 1998, the Province was granted with the total budget of 38 million to handle this task, to be carried over for three years, if the construction can not be accomplished in time.

2. Water quality testing: The Provincial Public Health Office has inspected water quality at various selected areas of those three main river lines.

3. Standard raft making: The Provincial authorities are trying to standardize raft-making in line with regulations of the Department of Harbour. All rafts must

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have garbage cans to avoid polluting the water. Given a large number of rafts and the budget constraints, only a few raft operators have participated in the move.

4. Town planning: The more systematic land use and urban expansion are now being promoted.

5. Stringent legal enforcement will be promoted, by soliciting cooperation of all involved parties in government sector in order to ensure strict enforcement of laws.

1.3 Garbage

Most of Kanchanaburi's population of about 199,783 persons reside in municipal/sanitary district areas. Coupled with no less than million visitors each year, garbage volume has increased very rapidly, notably in two major municipalities, now generating no less than 71.8 tons of garbage each day (Muang Kanchanaburi Municipality of 60 tons, and Tambon Ta Rua Phra Thaen Municipality of 11.8 tons). Garbage volume is now on the rise, while there is no systematic garbage disposal, Kanchanaburi is now in great need of proper remedial measures, so as to lessen future problems. In addition, intensive public relations should be carried out in order to promote public awareness in this respect.

Solutions

1. There should be a proper land-field for garbage disposal. Muang Kanchanaburi Municipality bought more land plots in 1995, of about 93 rai, for garbage disposal. These land plots are in Phanom Thuan District. The Ministry of Sciences, Technology and Environment in 1997, allocated total budget of 13,849,000 baht to Muang Kanchanaburi Municipality for constructing garbage disposal system.

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The Tambon Tha Rua Phra Taen Municipality constructed two incinerators, with daily disposal capacity of 26 tons.

2. The government, in addition, granted more budgets for local administrative units, i.e., Muang Kanchanaburi Municipality, Tambon Tha Rua Phra Taen Municipality, and other sanitary districts nearby the rivers, to purchase 10 garbage trucks, during 1993-1995, worth of about 6,604,500 baht. In 1996, the Ministry of Sciences, Technology and Environment allocated the total budget of 13 million baht to Muang Kanchanaburi Municipality to buy **sweeper and garbage trucks.** More budget of 3,230,000 baht was allocated to Muang Kanchanaburi Municipality for the purchase of garbage trucks, and of about 1,799,000 baht for the purchase of garbage trucks for the Tambon Tha Rua Phra Taen Municipality.

3. In addition, under the provincial development budget in FY 1994, additional budget of 2 million baht was granted to the Tambon Tha Rua Phra Taen Municipality for constructing one incinerator. The Municipality also contributed two million baht for construction. The results were quite satisfactory. Besides, the Municipality sought cooperation from local private sector to construct another incinerator in local areas. A main problem is that the local people did not cooperate in separate garbage, thereby making the subsequent disposal more difficult.

4. There should be garbage disposal through land-field under the proper sanitary practices. More budgets were granted for Muang Kanchanaburi Municipality to undertake this task. Then, more budgets would be sought from the Ministry of Sciences, Technology and Environment. It is expected that when the proper garbage disposal is in place, the problems regarding garbage disposal among the municipalities would be eased.

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1.4 Air Pollution

Main causes of air pollution problems in Kanchanaburi can be summarized, as follow:

1. There are a lot of factories in the province, and some of them, such as sugar mills and stone-grinding, etc., generate air pollution, considered hazardous for health.

2. Traffic is also a main source of air pollution. As a major tourist center and manufacturing city, there are a number of vehicles in the local municipalities and sanitary districts. Traffic congestion occasionally occur, thus polluting the air, while some vehicles are just too old for driving.

Solutions

1. Relevant government agencies should expedite examination of some polluting plants in the province.

2. There should be regular inspection of vehicle conditions, especially those generating black smokes, in the local areas in order to reduce air pollution.

The problems of deforestation, garbage, wastewater and air pollution now require serious attention. The problems must be solved promptly, and relevant parties should seek proper measures to handle future problems too. Cooperation of all public and private sectors is a key to success. Public awareness should be created among local people, so they can actively participate in the alleviation and rehabilitation of problems related to natural resources and environment, under support from relevant central agencies.

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2.5 Related research papers

Suriyan Srichan (1980: Abstract) undertook a study on the Roles of the Tambon Council in Tambon Development Planning, and found that readiness of members of the Tambon Councils affected the Tambon development planning process. Some members of the Council, with low education, irresponsible, old and inactive, possessed limitations in the development planning. They lacked initiatives, while there were budget constraints, unable to meet the local demands.

Pisit Boonchai (1985: A-B) studied Tambon Council's Participation in Forest Conservation: A Case Study of the Lower Northeastern Region. He found that Tambon Council participated in the move at a moderate level. Factors affecting their participation are status of Tambon councilors, information on forest conservation from the media, economic conditions, and provision of fuel for domestic cooking.

Khwan Sa-nguansermsri (1996: 76) studied Knowledge and Awareness of Village Committee in Preservation of Natural and artistic Environments: A Case Study of Sai Yok District, Kanchanaburi Province. The results showed that ages and level of participation in community activities affected awareness in preservation of natural and artistic environment at a 0.05 statistical significance.

Chairote Thanasanti (1992: 120) carried out the study on "Tambon Council's Participation in Natural Resources Conservation: A case Study of Ubon Ratchathani Province". He found that ex-officio members of Tambon Council were more active in participating in natural resources conservation than those elected members.

Anuchit Itsarayamet (1994: A-B) undertook the study on "Factors Affecting Awareness of Tambon Council in Alleviating Water Pollution in the Chao

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Phraya River: A Case Study of Muang District, Pathum Thani Province. He found that most people showed awareness at a moderate level. Based on Variance Analysis and Regression Analysis, most members of the Council, holding an education level higher than a primary level, and working as a farmer or hired worker, held more knowledge about water pollution. They showed a high level of media exposure. Those samples, who were not direct beneficiaries of the Chao Phraya River, showed higher awareness than other samples. In addition, the study showed that the monthly income level and domicile showed positive relationship to public awareness. On the other hand, ages, living periods in communities, and experiences related to water pollution, showed negative relationship in this respect. Statistical testing showed that those factors held statistical significance of 0.01.

Amorn Yaemsri (1995) undertook the study on "Knowledge and Understanding towards Roles of Expert Members in Tambon Council; A Case Study of Mae Sariang District, Mae Hong Son Province." About 69 samples of expert members were selected. Research findings (cited in Prince Damrong Rachanuparb Institute; 1996: 29) showed that:

1. The different education levels of expert members related to knowledge and understanding towards roles of Tambon Council.

2. The different periods of services as expert members in Tambon Council did not relate to knowledge and understanding towards roles of Tambon Council.

Udomdet Ratanasathien (1996: Abstract) studied the Roles of Tambon Administrative Organization in Local Development: A Case Study of Nonthaburi Province. The results showed that:

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1. Their roles contributed to economic development in terms of occupational development and promotions, as well as infrastructure development.

2. Their roles contributed to political development in terms of delegation of administrative power at a Tambon level. Development by local people led to progress in communities as the Tambon Administrative Organizations were able to conduct legal acts and contracts by themselves, without the needs to channel through government agencies as in the past. These led to greater flexibility in management in line with problems and actual needs of local people.

3. As for social and cultural development, they played active roles in the development of women, children, the elderly and the handicapped.

4. They encouraged local people to participate in the natural resources conservation, and in solving environmental problems under the "polluter-pay" principle.

As for the natural resources and environmental conservation, the Tambon Administrative Organizations undertook the following activities (Ibid.: 34-35):

1. They promoted proper public awareness and undertook public relations so as to create knowledge and common understanding towards benefits to be derived from natural resources and environment.

2. Focus was placed on the rehabilitation and reconstruction of depleted natural resources and environment. They promoted the construction of a park to honor the royal family, and the Beautiful Road to Reduce Pollution Project in Nonthaburi Province, etc.

3. They played active roles in prevention and control of wastewater and air pollution, while promoting popular participation in this respect.

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Somkiat Yutitham (1998: Abstract) undertook the study on "Readiness of Tambon Administrative Organization in Alleviation of Water Pollution: A Case Study of Ratchaburi Province". The results showed that the executive members, of about 76.2 percent, showed readiness at a moderate level, while 23.8 percent were not ready, due to low level of education. Knowledge and attitude were related to educational levels, while knowledge was related to media exposure at the 0.05 statistical significance level. Problems found included budget constraints, redundant government regulations, and cooperation of the general public. The lack of knowledge among the local people was a main hurdle to promote public participation. Other hurdles were the lack of supports for tools and budget from both public and private sectors. The study also recommended broad public relations in all aspects.

From the above studies, it can be summarized that the grouping of local people in various aspects, such as the Tambon Council, Village Committee, and the Tambon Administrative Organizations, will contribute to local development, notably the conservation of natural resources and environment. These will lead to sustainability of natural resources in the local areas.

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CHAPTER III

RESEARCH METHODOLOGIES

The study on the Roles of the Executive Committees of the Tambon Administrative Organization in Sustainable Natural Resources Management is a survey research by nature, using questionnaire for data collection, through the following methodologies:

3.1 Population

Of this research, population is the Executive Committees of the Tambon Administrative Organizations in Kanchanaburi. Focus is on 52 Tambons in 10 districts, where there are five major types of natural resources in the same area. These are, i.e., forest, soil, wild animals, water and minerals. Selected samples are 156 members of the TAO Executive Committees.

3.2 Sampling Size

To undertake the above research, the author applies the purposive random sampling to gather data from 156 selected samples in certain districts where five major types of natural resources can be found.

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Table 3: TAO, Executive Committees and Samples Categorized by Districts

Districts	# of TAO	Executive Committees	Samples
1.Dan Makham Tia	3	9	9
2.Sai Yok	7	21	21
3.Bo Ploi	6	18	18
4.Nong Prue	3	9	9
5.Si Sawat	6	18	18
6.Thong Pha Phum	6	18	18
7.Sangkha Buri	3	9	9
8.Phanom Thuan	7	21	21
9.Huay Krachao	4	12	12
10.Lao Khwan	7	21	21
Total	**52**	**156**	**156**

3.3 Research Tools

The author constructed research tools, based on related studies, documents, textbooks and research papers. The questionnaire used in this study can be divided in three part, i.e.,

Part 1 is concerned with general information of the TAO Executive Committees.

Part 2 is devoted to the roles in sustainable management of natural resources by the TAO Executive Committees. Six values of works are applied, i.e., most-practiced, more-practiced, moderate-practiced, less-practiced, least-practiced, and never.

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The author, in addition, defined terms of means, as follows:

Average	Operational Levels
0.00-0.99	Never practiced
1.00-1.49	Least practiced
1.50-2.49	Less practiced
2.50-3.49	Moderate practiced
3.50-4.49	More practiced
4.50-5.00	Most practiced

Part 3 is open-ended questionnaire focusing on comments towards the roles of TAO Executive Committees in sustainable management of natural resources in Kanchanaburi.

3.4 Measurement of Efficiency of Research Tools

1) Validity

The author presented the draft questionnaires to Chairman of the Thesis Committee in order to review appropriateness of language, whether they are clear and consistent with research purposes, seen as the ways to measure face validity.

2) Reliability

After improving the questionnaires upon advice of Chairman of the Thesis Committee, the author tried out the questionnaires with the non-sampled TAO Executive Committees, totaling 30 persons. Then, the results were tested for

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reliability coefficient, by using the Coefficient Alpha and Cronbach Values, through the formula, as below (Kitpreedabovisut, 1994: 251).

Reliability Testing

$$r_{tt} = \frac{K}{K-1}\left[\frac{(1-\Sigma s^2 i)}{s^2 x}\right]$$

when: r_{tt} = Accuracy

K = Number of questionnaires

$\Sigma s^2 i$ = Value of Variance of each questionnaire

$s^2 x$ = Variance of total scores

3.5 Data Collection

To collect data, the author brought the introductory letter from Dean of the Faculty of Social Sciences and Humanities, Mahidol University, and presented it to Chairman of the TAO Executive Committees in Kanchanaburi Province.

3.6 Data Analysis and Statistical Analyses

After examining accuracy and completeness of the data, the author prepared a code book, and encoded the data on diskettes for further analysis by using the SPSS/PC$^+$ (Statistical Package for Social Sciences), under the methods, as below:

1. Frequency and percentage were used to analyze general information on the samples of TAO Executive Committees.

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2. Means and Standard Deviation were used to analyzed the roles of TAO Executive Committees in sustainable management of natural resources.

3. To compare two groups of variables concerning the roles of TAO Executive Committees in sustainable management of natural resources, the author adopted the t-test analysis. To analyze more than two groups of variables, the One-Way Analysis of Variance was applied, and, in case of significant differences, a dual-testing method was applied through Scheffe's test.

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CHAPTER IV

STUDY RESULTS

To undertake the research on the Roles of the TAO Executive Committees in Sustainable Management of Natural Resources in Kanchanaburi Province, the author followed research methods, namely:

Results of Data Analysis

The author was able to gather 156 completed questionnaires, or equal to 100 percent. Data analytical results were presented in tables and essays, divided into 4 main parts, namely:

Part 1 analyzed personal and general information on the TAO Executive Committees.

Part 2 analyzed the roles of the TAO Executive Committees in sustainable management of natural resources.

Part 3 compared the roles of the TAO Executive Committees in sustainable management of natural resources.

Part 4 analyzed other comments concerning the TAO Executive Committees in sustainable management of natural resources.

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Part 1 Analysis of Personal and General Information on TAO Executive Committees

Part 1 focused on the analysis of personal and general information on TAO Executive Committees. Findings were, as below:

1.1 Personal Information

Personal information on the TAO Executive Committees showed most of them, or 76.90 percent, were men. Of these, 63.50 percent aged between 41-50 years old, and 45.50 percent had been living in respective Tambons for over 20 years. Most of them, or 38.50 percent, were working in agricultural sector. As for educational levels, most of them, or 39.10 percent, finished secondary schools, and 66.00 percent attended training on natural resources management.

Table 4: Amounts and Percentage of General Information on TAO Executive Committees

General Information	Amount	Percent
1. Gender		
1.1 Male	120	76.90
1.2 Female	36	23.10
2. Age		
2.1 < 30 years old	5	3.20
2.2 30-40 years old	37	23.70
2.3 41-50 years old	99	63.50
2.4 > 51 years old	15	9.60
3. Period residing in a Tambon		
3.1 < 10 years	23	14.70
3.2 10-20 years	62	39.70
3.3 > 20 years	71	45.50
4. Occupations		
4.1 Farmers	60	38.50
4.2 Traders	25	16.00
4.3 Hired workers	14	9.00
4.4 Self-employed	57	36.50
5. Educational levels		
5.1 Primary education	42	26.90

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General Information	Amount	Percent
5.2 Secondary education	61	39.10
5.3 Diploma	10	6.40
5.4 Bachelor's Degree	39	25.00
5.5 Higher than BA	4	2.60
6. Training on natural resources management		
6.1 Yes	103	66.00
6.2 No	53	34.00
Total	**156**	**100.00**

1.2 Related General Information

As for related general information, the research findings showed that most of the training courses on natural resources management, as attended by TAO Executive Committees, were involved with forestry, or 29.50 percent. This was followed by water, soil, wild animals and minerals, or 23.70, 19.20, 11.50 and 5.10 respectively. Details were shown in Table 5.

Table 5 : Topics of Training Courses on Natural Resources Management Attended by the TAO Executive Committees

Natural Resources	Frequency	Percent
1. Forestry	46	29.50
2. Water	37	23.70
3. Soil	30	19.20
4. Minerals	8	5.10
5. Wild Animals	18	11.50

Regarding exposure to information on the management of natural resources and environment, most TAO Executive Committees exposed themselves to information from various types of media. These were TV, 17.30 percent, radio broadcasting, 10.30 percent, newspapers, 14.70 percent, government news, 7.10 percent, textbooks/journals, 0.60 percent, and daily conversations, 11.50 percent.

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They usually received information of about 3-4 times a week, 1-2 times a week, 1-2 times a month, or never, with details as shown in Table 6 below:

Table 6: Exposure to Information on Management of Natural Resources and Environment

	Daily	3-4 Times /Week	1-2 Times /Week	1-2 Times /Month	Never
1. TV	27 (17.30)	21 (13.50)	25 (16.00)	13 (8.30)	70 (44.90)
2. Radio broadcasting	16 (10.30)	7 (4.50)	17 (10.90)	25 (16.00)	91 (58.30)
3. Newspapers	23 (14.70)	21 (13.50)	22 (14.10)	14 (9.00)	76 (48.70)
4. Government News	11 (7.10)	14 (9.00)	17 (10.90)	31 (19.90)	83 (53.20)
5. Textbooks/Journals	1 (0.60)	7 (4.50)	13 (8.30)	43 (27.60)	92 (59.00)
6. Daily Conversations	18 (11.50)	16 (10.30)	16 (10.30)	25 (16.00)	81 (51.90)

Part 2 Analysis of the Roles of the TAO Executive Committees in Sustainable Management of Natural Resources

The second part of this chapter is devoted to the analysis of the roles of the TAO Executive Committees in sustainable management of natural resources, especially forestry, soil, wild-animals, water and minerals. Details were as shown in Tables 7-11, as follows:

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2.1 Forestry

Table 7: Levels of Operation, Means, S.D. and Mode of Roles of TAO Executive Committees in Sustainable Management of Forestry

Forestry	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less	Moderate	More	Most			
1.Relevant parties designate vision, project framework and strategies for sustainable management of forestry	15 (9.60)	11 (7.10)	27 (17.30)	90 (57.70)	12 (57.70)	1 (0.60)	2.49	1.08	Moderate
2.There are concrete operational results of plans and projects.	8 (5.10)	20 (12.80)	36 (23.10)	77 (49.40)	10 (6.40)	5 (3.20)	2.49	1.07	Moderate
3.Opportunities are provided for local people and communities to participate in sustainable management of forestry.	10 (6.40)	18 (11.50)	33 (21.20)	70 (44.90)	22 (14.10)	3 (1.90)	2.54	1.13	Moderate
4.Government agencies are encouraged to develop management mechanisms for forestry.	15 (9.60)	14 (9.00)	31 (19.90)	65 (41.70)	26 (16.70)	5 (3.20)	2.56	1.24	Moderate
5.Private agencies are encouraged to develop management mechanisms for forestry.	15 (9.60)	20 (12.80)	34 (21.80)	62 (39.70)	21 (13.50)	4 (2.60)	2.42	1.23	Moderate
6.There are campaigns and dissemination of information to promote public awareness in forest preservation in a more systematic and sustainable manner.	14 (9.00)	14 (9.00)	26 (16.70)	53 (34.00)	45 (28.80)	4 (2.60)	2.74	1.29	Moderate
7.Local wisdom is promoted for forest preservation.	13 (8.30)	14 (9.00)	24 (15.40)	61 (39.10)	41 (26.30)	3 (1.90)	2.72	1.24	Moderate
8.Conserved and green areas are designated in the local areas.	21 (13.50)	12 (7.70)	28 (17.90)	49 (31.40)	37 (23.70)	9 (5.80)	2.62	1.43	Moderate
9.Eco-system zoning is conducted by taking into consideration the cultural and traditional diversities in the local areas.	13 (8.30)	12 (7.70)	45 (28.80)	63 (40.40)	22 (14.10)	1 (0.60)	2.46	1.10	Moderate
10.Group or core group is established to enhance sustainable management of forestry.	19 (12.30)	13 (8.30)	41 (26.30)	66 (42.30)	15 (9.60)	2 (1.30)	2.33	1.18	Moderate

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Table 7: Levels of Operation, Means, S.D. and Mode of Roles of TAO Executive Committees in Sustainable Management of Forestry (Cont.)

Forestry	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less	Moderate	More	Most			
11.Community networks have been established in order to acknowledge legal rights to know and utilize bio-diversities.	18 (11.50)	16 (10.30)	43 (27.60)	59 (37.80)	19 (12.20)	1 (0.60)	2.31	1.18	Moderate
12.Depleted forest areas have been rehabilitated.	15 (9.60)	18 (11.50)	38 (24.40)	55 (35.30)	27 (17.30)	3 (1.90)	2.45	1.24	Moderate
13.TAO coordinates with relevant agencies in sustainable management and preservation of forest.	12 (7.07)	19 (12.20)	30 (19.20)	67 (42.90)	24 (15.40)	4 (2.60)	2.54	1.19	Moderate
14.There are strict legal enforcements to suppress encroachment into forest areas.	18 (11.50)	14 (9.00)	31 (19.90)	51 (32.70)	35 (22.40)	7 (4.50)	2.59	1.39	Moderate
15.Children and the youth are encouraged to participate in sustainable management of the local forest areas.	9 (5.80)	13 (8.30)	25 (16.00)	49 (16.00)	50 (32.10)	60 (6.40)	2.95	1.26	Moderate
Total	215 (9.19)	228 (9.74)	492 (21.03)	937 (40.04)	406 (17.35)	62 (2.65)	2.55	0.94	Moderate

Table 7 showed that, in general, TAO Executive Committees played a moderate role in sustainable management of forestry ($\bar{X} = 2.55$). When considered by Items, the research findings showed that their performances were mostly at moderate and minimal levels only. Certain activities showing moderate performances included the promotion of participation of children and youth in the sustainable conservation of natural resources in the local areas ($\bar{X} = 2.95$), systematic campaigns and PR to promote public awareness in forest conservation, which would lead to sustainable development ($\bar{X} = 2.74$), and the promotion of local wisdom in forest preservation ($\bar{X} = 2.72$).

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Their minimal performances could be categorized, as follows: the development of community networks in forest preservation for the rights to know and utilize bio-diversities ($\bar{X}$ = 2.31); setting of group or core group in sustainable preservation of forestry ($\bar{X}$ = 2.33); and the promotion of private sector's participation in setting mechanisms for forestry preservation management ($\bar{X}$ = 2.42).

2.2 Soil Resources

Table 8: Levels of Operation, Means, S.D. and Mode of Roles of TAO Executive Committees in Sustainable Management of Soil Resources

Soil Resources	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less	Moderate	More	Most			
1.Relevant parties designate vision, project framework and strategies for sustainable management of soil.	17 (10.90)	21 (13.50)	42 (26.90)	62 (39.70)	12 (7.70)	2 (1.30)	2.24	1.16	Moderate
2.There are concrete operational results of projects and plans.	19 (12.20)	19 (12.20)	46 (29.50)	58 (37.20)	11 (7.10)	3 (1.90)	2.01	1.18	Moderate
3.Opportunities are provided for local people and communities to participate in sustainable management of soil.	15 (9.60)	19 (12.20)	41 (26.30)	60 (38.50)	17 (10.90)	4 (2.60)	2.37	1.20	Moderate
4.Government agencies are encouraged to develop management mechanisms for soil.	11 (7.10)	21 (13.50)	31 (19.90)	73 (46.80)	19 (12.20)	1 (0.60)	2.46	1.11	Moderate
5.Private agencies are encouraged to develop management mechanisms for soil.	11 (7.10)	26 (16.70)	33 (21.20)	67 (42.90)	17 (10.90)	2 (1.30)	2.38	1.14	Moderate

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Soil Resources	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less	Moderate	More	Most			
6.There are campaigns and dissemination of information to promote public awareness in soil conservation in a more systematic and sustainable manner.	6 (3.80)	17 (10.90)	32 (20.50)	65 (41.70)	33 (21.20)	3 (1.90)	2.71	1.10	Moderate
7.Local wisdom is promoted for soil conservation.	11 (7.10)	15 (9.60)	38 (24.40)	61 (39.10)	27 (17.30)	4 (2.60)	2.58	1.17	Moderate
8.Land use zoning is conducted, compatible with potential and environmental sustainability.	11 (7.10)	12 (7.70)	39 (25.00)	56 (35.90)	33 (21.20)	5 (3.20)	2.66	1.94	Moderate
9.Group or core group is established to enhance sustainable management of soil.	22 (14.10)	16 (10.30)	45 (28.80)	57 (36.50)	13 (8.30)	3 (1.90)	2.21	1.23	Moderate
10.Community networks have been established in order to acknowledge legal rights to know and utilize bio-diversities.	15 (9.60)	20 (12.80)	45 (28.80)	63 (40.40)	11 (7.10)	2 (1.30)	2.26	1.12	Moderate
11.Depleted land has been rehabilitated.	16 (10.30)	14 (9.00)	36 (23.10)	59 (37.80)	25 (16.00)	6 (3.80)	2.52	1.24	Moderate
12.There are measures to prevent and alleviate soil erosion problems.	19 (12.20)	17 (10.90)	28 (17.90)	62 (39.70)	28 (17.90)	2 (1.30)	2.44	1.28	Moderate
13.There are measures to protect and make use of land in certain areas with the prominent ecological and geological qualities, based on balance in eco-system.	18 (11.50)	18 (11.50)	32 (20.50)	62 (39.70)	25 (16.00)	1 (0.60)	2.39	1.24	Moderate
14.There are strict legal enforcement to suppress encroachment into protected areas.	26 (16.70)	20 (12.80)	30 (19.20)	50 (32.10)	27 (17.30)	3 (1.90)	2.26	1.39	Moderate

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Soil Resources	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less			Most			
15.Children and the youth are encouraged to participate in sustainable management of soil.	15 (9.60)	10 (6.40)	31 (19.90)	60 (38.50)	38 (24.40)	2 (1.30)	2.65	1.23	Moderate
Total	232 (9.91)	265 (11.32)	549 (23.46)	915 (39.10)	336 (14.36)	43 (1.84)	2.42	0.70	Moderate

Table 8 showed that, in general, the TAO Executive Committees played only minimal roles in sustainable management of soil resources ($\bar{X}$ = 2.42). When considered by Items, their levels of operations were mostly at moderate and minimal levels. Focus was placed on the campaigns to promote public awareness in the conservation of soil resources on a systematic and continuous manner which would lead to sustainable development ($\bar{X}$ = 2.71). They showed moderate level of operations in the zoning of land use compatible with potential and environmental conditions ($\bar{X}$ = 2.66); and the promotion of participation of children and youth in school in the sustainable conservation of soil resources ($\bar{X}$ = 2.65).

Certain activities showing minimal level of operations could be categorized, as follows: concrete implementation of plans and projects related to soil resources ($\bar{X}$ = 2.01); the setting of group or core group for sustainable management of soil resources conservation ($\bar{X}$ = 2.21); and the setting of visions for programs/projects, and management strategies for soil resources preservation ($\bar{X}$ = 2.24).

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2.3 Wild Animals

Table 9: Levels of Operations, Means, S.D. and Mode of Roles of TAO Executive Committee in Sustainable Management of Wild Animals

Wild Animals	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less	Moderate	More	Most			
1.Relevant parties designate vision, project framework and strategies for sustainable management of wild animals.	21 (13.50)	18 (11.50)	23 (21.20)	68 (43.60)	14 (9.00)	2 (1.30)	2.70	1.23	Moderate
2.There are concrete operational results of projects and plans.	24 (15.40)	19 (12.20)	36 (23.10)	63 (40.40)	12 (7.70)	2 (1.30)	2.17	1.24	Moderate
3.Opportunities are provided for local people and communities to participate in sustainable management of wild animals.	23 (14.70)	18 (1.50)	31 (19.90)	67 (42.90)	15 (9.60)	2 (1.30)	2.25	1.26	Moderate
4.Government agencies are encouraged to develop management mechanisms for wild animals.	19 (12.20)	20 (12.20)	34 (21.80)	62 (39.70)	20 (12.82)	1 (0.60)	2.23	1.23	Moderate
5.Private agencies are encouraged to develop management mechanisms for wild animals.	24 (15.40)	22 (14.10)	35 (22.40)	50 (32.10)	24 (15.40)	1 (0.60)	2.20	1.31	Moderate
6.There are campaigns and dissemination of information to promote public awareness in wild animals preservation in a more systematic and sustainable manner.	14 (9.00)	17 (10.90)	31 (19.90)	56 (35.90)	32 (20.50)	6 (3.80)	2.60	1.28	Moderate
7.Local wisdom is promoted for wild animals preservation.	17 (10.90)	18 (11.50)	28 (17.90)	70 (44.90)	22 (14.10)	1 (0.60)	2.42	1.21	Moderate

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Table 9: Levels of Operations, Means, S.D. and Mode of Roles of TAO Executive Committee in Sustainable Management of Wild Animals (Cont.)

Wild Animals	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less	Moderate	More	Most			
8.Group or core group is established to enhance sustainable management of wild animals.	24 (15.40)	16 (10.30)	38 (24.40)	58 (37.20)	17 (10.90)	3 (1.09)	2.24	1.29	Moderate
9.Community networks have been established in order to acknowledge legal rights to know and utilize bio-diversities.	19 (12.20)	20 (12.80)	33 (21.20)	66 (42.30)	16 (10.30)	2 (1.30)	2.30	1.22	Moderate
10.There are measures to preserve, rehabilitate and develop wild animals for the sake of balance in eco-system.	20 (12.80)	17 (10.90)	43 (27.60)	51 (32.70)	20 (12.80)	5 (3.20)	2.31	1.29	Moderate
11.There are strict legal enforcement to protect and suppress illegal poaching.	21 (13.50)	18 (11.50)	27 (17.30)	56 (35.90)	30 (19.20)	4 (2.60)	2.44	1.35	Moderate
12.Children and the youth are encouraged to participate in conservation of wild animals.	13 (8.30)	16 (10.30)	28 (17.90)	60 (38.50)	33 (21.20)	6 (3.80)	2.65	1.26	Moderate
13.TAO Coordinates with other agencies involved in sustainable conservation and management of natural resources.	14 (9.00)	22 (14.10)	36 (23.10)	60 (38.50)	19 (12.20)	5 (3.20)	2.40	1.23	Moderate
Total	253 (12.48)	241 (11.88)	433 (21.25)	787 (38.81)	274 (13.51)	40 (1.97)	2.35	1.08	Moderate

Table 9 showed that, in general, the TAO Executive Committees played only minimal roles ($\bar{X}$ = 2.35) in sustainable management of wild-animals. When considered by Items, their levels of operations were mostly at moderate and minimal levels. Chief activities included the setting of visions, operational framework and strategies for management of wild animals ($\bar{X}$ = 2.70); the promotion of participation of children and youth in schools in sustainable preservation of wild animals ($\bar{X}$ = 2.65); and the campaigns and PR to promote public awareness in systematic and

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continuous preservation of wild animals, which would lead to sustainable development ($\bar{X}$ = 2.60).

Certain activities showing only minimal level of operations include concrete implementation of plans and projects related to wild animals ($\bar{X}$ = 2.17); the promotion of private sector's participation in the setting of management mechanisms for wild animal resources ($\bar{X}$ = 2.20); and the provision of opportunity for people and community's participation in the management of wild-animal preservation, which would lead to sustainable development ($\bar{X}$ = 2.25).

2.4 Water Resources

Table 10 : Levels of Operations, Means, S.D. and Mode of Roles of TAO Executive Committees in Sustainable Management of Water Resources

Water Resources	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less	Moderate	More	Most			
1.Relevan parties designate vision, project framework and strategies for sustainable management of water.	9 (5.80)	15 (9.60)	20 (12.80)	71 (45.50)	36 (23.10)	5 (3.20)	2.80	1.17	Moderate
2.There are concrete operational results of projects and plans.	7 (4.50)	13 (8.30)	33 (21.20)	61 (39.10)	37 (23.70)	5 (3.20)	2.79	1.13	Moderate
3.Opportunities are provided for local people and communities to participate in sustainable management of water.	6 (3.80)	19 (12.20)	21 (13.50)	68 (43.60)	39 (25.00)	3 (1.90)	2.80	1.12	Moderate
4.Water is provided in line with the needs of people.	6 (3.80)	8 (5.10)	16 (10.30)	51 (32.70)	62 (39.70)	13 (8.30)	3.24	1.16	High
5.There are sound control and maintenance of water quality, pollution and drainage system.	6 (3.80)	5 (3.20)	25 (16.00)	58 (37.20)	49 (31.40)	13 (8.30)	3.14	1.12	Moderate

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Water Resources	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less	Moderate	More	Most			
6.Government agencies are encouraged to develop mechanisms to supervise and manage water resources.	9 (5.80)	10 (6.40)	25 (16.00)	59 (37.80)	42 (26.90)	11 (7.10)	2.95	1.22	Moderate
7.Private agencies are encouraged to develop mechanisms to supervise and manage water resources.	13 (8.30)	10 (6.40)	32 (20.50)	55 (35.30)	35 (22.40)	11 (7.10)	2.78	1.30	Moderate
8.There is sustainable mechanisms to protect and reduce destruction of watershed areas.	12 (7.70)	11 (7.10)	28 (17.90)	53 (34.00)	39 (25.00)	13 (8.30)	2.87	1.32	Moderate
9.There are campaigns and dissemination of information to promote public awareness in conservation of water resources.	8 (5.10)	8 (5.10)	29 (18.60)	58 (37.20)	43 (27.60)	10 (6.40)	2.96	1.18	Moderate
10.Local wisdom is promoted for water conservation.	11 (7.10)	11 (7.10)	27 (17.30)	57 (36.50)	42 (26.90)	8 (5.10)	2.85	1.25	Moderate
11.There are measures to designate proper uses of water in various activities on a systematic and thrifty basis, consistent with potential and the environment.	4 (2.60)	11 (7.10)	30 (19.20)	55 (35.30)	44 (28.20)	12 (7.70)	3.03	1.14	Moderate
12.Group or core group is established to enhance sustainable management of water.	9 (5.80)	16 (10.30)	29 (18.60)	70 (44.90)	26 (16.70)	6 (3.80)	2.68	1.16	Moderate
13.Community networks have been established in order to acknowledge legal rights to know and utilize water resources.	9 (5.80)	14 (9.00)	27 (17.30)	73 (46.80)	29 (18.60)	4 (2.60)	2.71	1.13	Moderate
14.Depleted water resources have been rehabilitated for sustainable uses.	9 (5.80)	9 (5.80)	37 (23.70)	62 (39.70)	33 (21.20)	6 (3.80)	2.76	1.14	Moderate

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Water Resources	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less			Most			
15.There are strict legal enforcement to protect and suppress encroachment into water resources.	20 (12.80)	10 (6.40)	32 (20.50)	60 (38.50)	26 (16.70)	8 (5.10)	2.55	1.34	Moderate
Total	138 (5.90)	170 (7.26)	411 (17.56)	911 (38.93)	582 (24.87)	128 (5.47)	2.86	0.92	Moderate

Table 10 showed that, in general, the TAO Executive Committees played only moderate roles in sustainable management of water resources ($\bar{X}$ = 2.86). When considered by Items, the levels of operations were mostly at a moderate level. Key activities included provision of water to meet with public demand ($\bar{X}$ = 3.24); control of water quality, pollution and drainage ($\bar{X}$ = 3.14); and the setting of water consumption on a thrifty and systematic manner compatible with sustainable environmental management ($\bar{X}$ = 3.03).

Other activities with minimal levels of operations included stringent enforcement of laws to prevent encroachment into and destruction of water resources ($\bar{X}$ = 2.55); the setting of group or core group in sustainable preservation and management of water resources ($\bar{X}$ = 2.68); and the development of community networks for the right to know and utilize water resources.

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2.5 Mineral Resources

Table 11: Levels of Operations, Means, S.D. and Mode of Roles of TAO Executive Committees in Sustainable Management of Mineral Resources

Mineral Resources	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less	Moderate	More	Most			
1.Relevant parties designate vision, project framework and strategies for sustainable management of mineral resources.	25 (16.00)	24 (15.40)	43 (27.60)	51 (32.70)	10 (6.40)	3 (1.90)	2.04	1.25	Moderate
2.There are concrete operational results of projects and plans.	24 (15.40)	25 (16.00)	43 (27.60)	47 (30.10)	16 (10.30)	1 (0.60)	2.06	1.25	Moderate
3.Opportunities are provided for local people and communities to participate in sustainable management of mineral resources.	20 (12.80)	28 (17.90)	35 (22.40)	50 (32.10)	22 (12.20)	1 (3.20)	2.19	1.26	Moderate
4.Government agencies are encouraged to develop mechanisms for sustainable management of mineral resources.	17 (10.90)	22 (14.10)	43 (27.60)	50 (32.10)	19 (12.20)	5 (3.20)	2.30	1.26	Moderate
5.Private agencies are encouraged to develop mechanisms for sustainable management of mineral resources.	20 (12.80)	26 (16.70)	39 (25.00)	53 (34.00)	13 (8.30)	5 (3.20)	2.18	1.27	Moderate
6.There are campaigns and dissemination of information to promote public awareness in conservation of mineral resources.	18 (11.50)	21 (13.50)	36 (23.10)	60 (38.50)	18 (11.50)	3 (1.90)	2.31	1.24	Moderate
7.Conservation and utilization zones have been designated.	21 (13.50)	23 (4.70)	37 (23.70)	48 (30.80)	20 (12.80)	7 (4.50)	2.28	1.36	Moderate
8.There are clear measures to control and preserve utilization of mineral resources.	26 (16.70)	24 (15.40)	31 (19.90)	40 (25.60)	28 (17.90)	7 (4.50)	2.26	1.46	Moderate

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Table 11: Levels of Operations, Means, S.D. and Mode of Roles of TAO Executive Committees in Sustainable Management of Mineral Resources (Cont.)

Mineral Resources	Never Practiced	Levels of Operation					$\bar{X}$	S.D.	Mode
		Least	Less	Moderate	More	Most			
9.There are measures to control releases of heavy metal substances into public water resources.	26 (16.70)	21 (13.50)	31 (19.90)	45 (28.80)	25 (16.00)	8 (5.10)	2.30	1.46	Moderate
10.Group or core group is established to enhance sustainable management of mineral resources.	22 (14.10)	22 (14.10)	40 (25.60)	48 (30.80)	18 (11.50)	6 (3.80)	2.23	1.33	Moderate
11.Community networks have been established in order to acknowledge legal rights to know and utilize mineral resources.	19 (12.20)	25 (16.00)	39 (25.00)	49 (31.40)	16 (10.30)	7 (5.10)	2.27	1.33	Moderate
12.There are strict legal enforcement to protect and suppress encroachment into and destruction of mineral resources.	27 (17.30)	13 (8.30)	35 (22.40)	45 (28.80)	22 (14.10)	14 (9.00)	2.41	1.51	Moderate
Total	265 (14.15)	274 (14.64)	452 (24.15)	586 (31.30)	227 (12.13)	68 (3.63)	2.24	1.50	Moderate

Table 11 showed that, in general, the TAO Executive Committees played only minimal roles in sustainable management of mineral resources. When categorized by Items, their levels of operations were mostly at a minimal levels. Key activities were stringent enforcement of laws to prevent encroachment into and destruction of mineral resources (**X** = 2.24); campaigns and PR to promote public awareness in systematic and continuous preservation of mineral resources, which would lead to sustainable development (**X** = 2.31); and the promotion of government agencies in setting management mechanism for mineral resources (**X** = 2.30).

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Other activities showing low level of operations could be categorized into the setting of vision for programs/projects, and management strategies for mineral resources preservation (**X** = 2.04); concrete implementation of plan and projects related to mineral resources (**X** = 2.06); and the promotion of private sector's participation, in setting management mechanisms of mineral resources (**X** = 2.18).

Part 3 An Analysis to Compare the Roles of the TAO Executive Committees in Sustainable Management of Natural Resources

Part 3 is devoted to an analysis to compare the roles of TAO Executive Committees in sustainable management of natural resources in order to test hypothesis. Key variables were classified into genders, ages, occupations, educational levels, and training on natural resources management. Details were as in Table 12-13, as follows:

3.1 TAO Executive Committees with Different Genders

Table 12: Comparison of Differences of Means and S.D. of the Roles in Natural Resources Management of the TAO Executive Committees, Classified by Genders

Natural Resources Management	Male		Female		t
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	
1. Forestry	2.55	0.95	2.53	0.95	0.13
2. Soil	2.38	0.98	2.57	0.93	-1.08
3. Wild Animals	2.31	1.09	2.48	1.05	-0.84
4. Water	2.88	0.98	2.79	0.08	0.55
5. Mineral	2.23	1.16	2.27	1.12	-0.22
Total	2.48	0.92	2.54	0.89	-0.33

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Table 12 showed that, in general, TAO Executive Committees with different genders did not play different roles in sustainable management of natural resources, with statistical significance. The same is true, when considering by sectors, as there was no significant differences in this respect.

3.2 TAO Executive Committees with Different Ages

Table 13: Comparison of Differences of Means and S.D. of Roles in Sustainable Management of Natural Resources of TAO Executive Committees, Classified by Ages

Natural Resources Management	< 30 yr.		30 – 40 yr.		41 – 50 yr.		> 50 yr.	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	x	S.D.	$\bar{x}$	S.D.
1. Forestry	2.69	0.42	2.59	0.88	2.49	0.98	2.73	1.00
2. Soil	2.56	0.12	2.41	0.87	2.38	1.01	2.71	0.92
3. Wild Animals	2.80	0.83	2.27	1.02	2.30	1.13	2.72	0.93
4. Water	2.93	0.64	2.83	0.99	2.82	0.90	3.19	1.03
5. Mineral	2.60	0.63	2.28	1.26	2.15	1.13	2.55	1.13
Total	**2.72**	**0.62**	**2.49**	**0.90**	**2.44**	**0.93**	**2.79**	**0.93**

Table 13 showed that, in general, the TAO Executives Committees, aged below 30 and above 50 years, played a moderate role (X = 2.72, x = 2.79) in sustainable management of natural resources. On the other hand, those executive members, aged between 30-40, and 41-50 years old, played only minimal roles (X = 2.49, X = 2.44).

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Table 14: Analysis of Variance to Compare the Roles in Sustainable Management of Natural Resources of the TAO Executive Committees, Classified by Ages

Natural Resources Management	Sources of Variance	df	SS	MS	F
1. Forestry	Inter-group	3	0.98	0.33	0.36
	Intra-group	152	136.69	0.90	
	Total	155	137.67		
2. Soil	Inter-group	3	1.52	0.51	0.54
	Intra-group	152	143.99	0.95	
	Total	155	145.52		
3. Wild Animals	Inter-group	3	3.53	1.18	1.01
	Intra-group	152	176.70	1.16	
	Total	155	180.23		
4. Water	Inter-group	3	1.83	0.61	0.71
	Intra-group	152	130.42	0.86	
	Total	155	132.26		
5. Mineral	Inter-group	3	2.92	0.97	0.73
	Intra-group	152	202.07	1.33	
	Total	155	204.99		
Total	**Inter-group**	**3**	**1.82**	**0.61**	**0.73**
	Intra-group	**152**	**126.79**	**0.83**	
	Total	**155**	**128.61**		

Table 14 showed that the Analysis of Variance to compare the roles of the TAO Executive Committees in sustainable management of natural resources, with different ages, did not show any difference with statistical significance, contradicting the prior hypothesis.

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3.3 TAO Executive Committees with Different Occupations

Table 15: Comparison of Differences of Means and S.D. in Sustainable Management of Natural Resources with Different Occupations

Natural Resources Management	Farmers		Traders		Hired-workers		Self-employed	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
1. Forestry	2.59	0.96	2.62	0.94	2.36	1.16	2.52	0.89
2. Soil	2.43	1.04	2.58	1.02	2.39	1.08	2.35	0.85
3. Wild Animals	2.31	1.16	2.48	1.04	2.14	1.03	2.39	1.03
4. Water	2.91	0.98	2.94	0.98	2.68	1.11	2.82	0.80
5. Mineral	2.23	1.23	2.26	1.19	2.04	1.21	2.28	1.05
Total	**2.51**	**0.98**	**2.59**	**0.90**	**2.34**	**1.04**	**2.48**	**0.82**

Table 15 showed that, in general, TAO Executive Committees, working as farmers and traders played moderate roles (X = 2.51, X = 2.59) in sustainable management of natural resources. Those who worked as hired-workers and self-employed played only minimal roles (X = 2.34, X = 2.48).

Table 16: Analysis of Variance to Compare the Roles in Sustainable Management of Natural Resources of TAO Executive Committees, Classified by Occupations.

Natural Resources Management	Sources of Variance	df	SS	MS	F
1. Forestry	Inter-group	3	0.76	0.26	0.20
	Intra-group	152	136.90	0.90	
	Total	155	137.67		
2. Soil	Inter-group	3	0.93	0.31	0.33
	Intra-group	152	144.59	0.95	
	Total	155	145.52		
3. Wild Animals	Inter-group	3	1.22	0.41	0.34
	Intra-group	152	179.01	1.18	
	Total	155	180.23		
4. Water	Inter-group	3	0.83	0.28	0.32
	Intra-group	152	131.43	0.86	
	Total	155	132.26		
5. Mineral	Inter-group	3	0.67	0.22	0.17
	Intra-group	152	204.33	1.34	
	Total	155	204.99		
Total	**Inter-group**	**3**	**0.59**	**0.20**	**0.23**
	Intra-group	**152**	**128.02**	**0.84**	
	Total	**155**	**128.61**		

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Table 16 showed that the Analysis of Variance to compare the roles in sustainable management of natural resources of the TAO Executive Committees with different occupations did not show any significant difference, contradicting the prior hypothesis.

3.4 TAO Executive Committees with Different Educational Levels

Table 17: Comparison of Differences of Means and S.D. of Roles in Sustainable Management of Natural Resources, Classified by Educational Levels

Natural Resources Management	Primary Education		Secondary Education		Diploma		BA		Hither than BA	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
1. Forestry	2.73	0.71	2.68	0.95	2.71	0.90	2.15	1.07	1.90	0.76
2. Soil	2.61	0.82	2.57	0.98	2.51	0.99	1.99	1.02	2.17	0.80
3. Wild Animals	2.52	0.90	2.41	1.01	2.64	1.04	2.03	1.21	1.94	0.78
4. Water	2.87	0.80	3.08	0.90	2.69	1.10	2.56	0.99	2.72	0.77
5. Mineral	2.37	1.06	2.27	1.22	2.23	1.16	2.08	1.14	1.88	1.36
Total	**2.63**	**0.76**	**2.62**	**0.91**	**2.57**	**0.99**	**2.17**	**1.02**	**2.15**	**0.58**

Table 17 showed that, in general, the TAO Executive Committees holding education at primary, secondary and diploma levels played moderate roles ($\bar{X}$ = 2.63, $\bar{X}$ = 2.63, $\bar{X}$ = 2.57) in sustainable management of natural resources. Those holding education at BA and higher than BA levels played only minimal roles ($\bar{X}$ = 2.17, $\bar{X}$ = 2.15).

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Table 18: Analysis of Variance to Compare the Roles in Sustainable Management of Natural Resources of the TAO Executive Committees, Classified by Educational Levels

Natural Resources Management	Sources of Variance	Df	SS	MS	F
1. Forestry	Inter-group	4	10.23	2.56	3.03*
	Intra-group	151	127.44	0.84	
	Total	155	137.67		
2. Soil	Inter-group	4	10.45	2.61	2.92*
	Intra-group	151	135.07	0.89	
	Total	155	145.52		
3. Wild Animals	Inter-group	4	6.89	1.72	1.50
	Intra-group	151	173.34	1.15	
	Total	155	180.23		
4. Water	Inter-group	4	7.04	1.76	2.12*
	Intra-group	151	125.21	0.83	
	Total	155	132.26		
5. Mineral	Inter-group	4	2.21	0.55	0.41
	Intra-group	151	202.78	1.34	
	Total	155	204.99		
Total	**Inter-group**	**4**	**6.45**	**1.61**	**1.99***
	Intra-group	**151**	**122.16**	**0.81**	
	Total	**155**	**128.61**		

* 0.5 Statistical Significance

Table 18 showed that the Analysis of Variance to Compare the roles of the TAO Executive Committees in sustainable management of natural resources, holding different levels of education, showed different results at 0.05 statistical significance, compatible with the prior hypothesis. The same was true for the analysis by sectors, i.e., forestry, soil, and water, showing different results at 0.05 statistical significance.

Table 19: Dual Testing of the Roles in Sustainable Management of Forestry of the TAO Executive Committees, Classified by Educational Levels

Education		Above BA	BA	Secondary	Diploma	Primary
	$\bar{x}$	1.95	2.15	2.68	2.71	2.73
Above BA	1.95	-	0.20	0.73	0.76*	0.78*
BA	2.15		-	0.53	0.56	0.58
Secondary	2.68			-	0.53	0.05
Diploma	2.71				-	0.02
Primary	2.73					-

* 0.05 Statistical Significance

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Table 19 showed that the TAO Executive Committees, holding education above BA and diploma levels, and those holding education above BA and primary levels, played different roles in forestry management, with 0.05 statistical significance.

Table 20: Dual Testing of the Roles in Sustainable Management of Soil of the TAO Executive Committees, Classified by Educational Levels

Education	$\bar{x}$	Above BA	BA	Secondary	Diploma	Primary
		1.99	2.17	2.51	2.57	2.61
Above BA	1.99	-	0.18	0.52	0.58*	0.62*
BA	2.17		-	0.34	0.40	0.44
Secondary	2.51			-	0.06	0.10
Diploma	2.57				-	0.04
Primary	2.61					-

* 0.05 Statistical Significance

Table 20 showed that the TAO Executive Committees, holding education at BA and diploma levels, and those holding education at BA and primary levels, played different roles in soil management, with 0.05 statistical significance.

Table 21: Dual Testing of Roles in Sustainable Management of Water of TAO Executive Committees, Classified by Educational Levels

Education	$\bar{x}$	Above BA	BA	Secondary	Diploma	Primary
		2.56	2.69	2.72	2.87	3.08
Above BA	2.56	-	0.13	0.16	0.31	0.52*
BA	2.69		-	0.06	0.18	0.39
Secondary	2.72			-	0.15	0.36
Diploma	2.87				-	0.21
Primary	3.08					-

* 0.05 Statistical Significance

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Table 21 showed that the TAO Executive Committees, holding education at BA and primary levels, played different roles in water management with 0.05 statistical significance.

Table 22: Dual Testing of the Roles in Sustainable Management of Natural Resources in General of the TAO Executive Committees, Classified by Educational Levels

Education	$\bar{x}$	Above BA	BA	Secondary	Diploma	Primary
		2.15	2.17	2.57	2.62	2.63
Above BA	2.15	-	0.02	0.42	0.47	0.48*
BA	2.17		-	0.40	0.45	0.46
Secondary	2.57			-	0.05	0.06
Diploma	2.62				-	0.01
Primary	2.63					-

* 0.05 Statistical Significance

Table 22 showed that the TAO Executive Committees, holding education above BA and primary levels, played different roles in sustainable management of natural resources in general, with 0.05 statistical significance.

Table 23: Comparison of Differences of Means and S.D. of the Roles in Natural Resources Management of the TAO Executive Committees, Classified by Training on Natural Resources Management

Natural Resources Management	Yes		No		t
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	
1. Forestry	2.47	0.92	2.70	0.97	-1.47
2. Soil	2.29	0.96	2.68	0.98	-2.49*
3. Wild Animals	2.26	1.04	2.53	1.13	-1.43
4. Water	2.76	0.89	3.06	0.97	-1.91
5. Mineral	2.15	1.10	2.40	1.23	-1.24
Total	**2.40**	**0.88**	**2.69**	**0.95**	**-1.88**

Table 23 showed that, in general, there was no significant differences in the roles in natural resources management, played by the TAO Executive Committees, whether or not they had ever attended training on natural resources management.

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When considered by sectors, both played different roles at 0.05 statistical significance for the management of soil.

Part 4 Analysis of Other Comments of the TAO Executive Committee Concerning Sustainable Management of Natural Resources

Part 4 analyzed other comments of the TAO Executive Committees concerning sustainable management of natural resources, i.e., forestry, soil, wild animals, water and mineral. Details were as in Tables 24-28, below:

4.1 Forestry

Table 24: Number and Percentage of Other Comments of the TAO Executive Committees Concerning Sustainable Management of Forestry

Other Comments	#	%
1. It is necessary to intensively encourage children and the youth, including local people to develop public awareness in forest preservation.	43	37.39
2. Local leaders should actively participate in legal enforcement for forest preservation	37	32.17
3. There should be more training courses on forest conservation management on a sustainable basis for all communities	21	18.26
4. There should be a community group to actively participate in forest preservation.	14	12.17
Total	**115**	**100.00**

From Table 24, most TAO Executive Committees (37.19 percent) agreed that there be measures to intensively encourage children and the youth, including local people to develop public awareness in forest preservation. In addition, they were of the view that local leaders should actively participate in legal enforcement for forest preservation; that there should be more training courses on sustainable management

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of forest preservation; and that there should be a community group to actively participate in forest preservation, or 32.17, 18.26 and 12.17 percent, respectively.

4.2 Soil Resources

Table 25: Number and Percentage of Other Comments for Sustainable Management of Soil

Other Comments	#	%
1. It is necessary to promote public awareness among local people so they can effectively participate in soil conservation.	34	33.33
2. There should be regular training on sustainable development of soil.	31	30.39
3. Information on soil development should be regularly disseminated.	26	25.49
4. There should be legal measures to strictly protect soil resources.	11	10.78
Total	**102**	**100.00**

From Table 25, most TAO Executive Committees (33.33 percent) found it necessary to promote public awareness among local people, so they could effectively participate in soil conservation. Other comments, as expressed by the TAO Executives, were, as follows: there should be regular training on sustainable development of soil; information on soil development should be regularly disseminated; and there should be legal measures to strictly protect soil resources, or 30.39, 25.49 and 10.78 percent, respectively.

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4.3 Wild Animals

Table 26: Number and Percentage of Other Comments on Sustainable Management of Wild Animals

Other Comments	#	%
1. There should be effective measures to encourage the setting of conservation group for wild animals, with sound stability of the group itself.	37	40.66
2. There should be stringent legal enforcement.	29	31.87
3. There should be measures to regularly promote public awareness in wild-life conservation among children and the youth.	16	17.58
4. Both public and private sectors concerned should play actively roles in conservation and culture of wild animals.	9	9.89
Total	**91**	**100.00**

From Table 26, most TAO Executives (40.66 percent) found it necessary for relevant parties to adopt effective measures to encourage the setting of conservation group for wild animals, with sound stability of the group itself. Other comments included stringent legal enforcement; the promotion of public awareness among children and the youth; and greater participation of both public and private sectors in conservation and culture of wild animals, or 31.87, 17.58 and 9.89 percent, respectively.

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4.4 Water Resources

Table 27: Number and Percentage of Other Comments on Sustainable Management of Water Resources.

Other Comments	#	%
1. There should be campaigns and dissemination of knowledge about thrifty use of water.	31	46.27
2. There should be measures to regularly promote public awareness for conservation of water resources.	24	35.82
3. There should be stringent legal enforcement to suppress encroachment into water resources and generation of water pollution.	12	17.91
Total	**67**	**100.00**

From Table 27, most TAO Executive Committees (46.27 percent) considered there be campaigns and dissemination of knowledge about thrifty use of water. Other comments were, namely; there should be measures to regularly promote public awareness for conservation of water resources; and there should be stringent legal enforcement to suppress encroachment into water resources, and generation of water pollution, or 35.82 and 17.91 percent, respectively.

4.5 Mineral Resources

Table 28: Number and Percentage of Other Comments on Sustainable Management of Mineral Resources.

Other Comments	#	%
1. Related government agencies should regularly and strictly enforce the laws against those mines generating pollution in community areas.	54	51.92
2. There should be measures to promote public awareness among children and the youth for mineral resources conservation.	42	40.38
3. Local communities should be able to participate in management of indigenous mineral resources.	8	7.70
Total	**104**	**100.00**

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From Table 28, most TAO Executive Committees (51.92 percent) agreed that related government agencies regularly and strictly enforce the laws against those mines generating pollution in community areas. Other Comments were, namely: there should be measures to promote public awareness among children and the youth for mineral resources conservation; and local communities should be able to participate in management of indigenous mineral resources, or 40.38 and 7.70 percent, respectively.

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CHAPTER V

DISCUSSION

Findings of the research on the Roles of the TAO Executive Committees in Sustainable Management of Natural Resources in Kanchanaburi Province can be brought up for further discussion, as follows

5.1 The Roles of the TAO Executive Committees in Sustainable Management of Natural Resources

Most TAO Executive Committees in Kanchanaburi played moderate roles in sustainable management of forestry ($\bar{X}$ = 2.55), and water ($\bar{X}$ = 2.86). They played only minimal roles in sustainable management of soil ($\bar{X}$ = 2.42), wild animals ($\bar{X}$ = 2.29), and mineral ($\bar{X}$ = 2.24). This would be due to the fact that most of the provincial areas of 7,226,250 rai, or 59.34 percent, are forest areas. These can be categorized into 15 forest reserves, five national parks, one natural park, two wild-life sanctuaries, and three no-hunting zones. The data show that over three-fourths of the provincial areas are forest areas, most of which are rain and tropical forests, the largest forest areas of the country and the Southeast Asian Region. These include natural water sources, i.e., Khwai Noi, Khwai Yai and Mae Klong Rivers, with total lengths of 840 kilometers. The Province sacrificed its vast forest areas for the construction of three major dams, i.e., Sri Nakharin, Vachiralongkorn and Khao Laem Dams, equal to the total water reservoir areas of 468,125 rai. Given the total

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provincial areas of 12,176,967 rai, over one-third, or four percent of the provincial areas are under water. With the proportion of the vast forest areas of over 59.34 percent, as well as water reservoirs and three main rivers of over 840 km long, it is very difficult to maintain thorough management of these resources. Therefore, most TAO Executive Committees could play only moderate roles in this respect. This is consistent with research findings by Pisit Bunyachai (1985: A-B), focusing on Participation in Forest Preservation by Tambon Councils in the Lower Northeastern Region. The same is true for the research on Factors Affecting Public Awareness of Tambon Councils towards Alleviation of Pollution in the Chao Phraya River : A Case Study of Muang District, Pathum Thani Province, most Tambon Councils possessed a moderate level of public awareness towards the alleviation of pollution in the Chao Phraya River.

5.2 Results of Hypothesis Testing

The author analyzed the research findings in order to compare the roles of the TAO Executive Committees in sustainable management of natural resources. The comparison is aimed at testing hypothesis, classified by genders, ages, occupations, educational levels and training on natural resources management. The results can be shown in Table 29, as follows:

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Table 29: Comparison of the Roles of the TAO Executive Committee in Sustainable Management of Natural Resources

Independent Variables	Natural Resources Management				
	Forestry	Soil	Wild Animals	Water	Mineral
Genders	Non. Sig	Non. Sig	Non. Sig	Non. Sig	Non. Sig
Ages	Non. Sig	Non. Sig	Non. Sig	Non. Sig	Non. Sig
Occupations	Non. Sig	Non. Sig	Non. Sig	Non. Sig	Non. Sig
Educational Levels	Sig	Sig	Non. Sig	Sig	Non. Sig
Training on Natural Resources Management	Non. Sig	Sig	Non. Sig	Non. Sig	Non. Sig

Sig = Significant at .05
Non.Sig = Non Significant at .05

2.1 The TAO Executive Committees in different genders played different roles in sustainable management of forest, soil, wild animals, water and mineral, with statistical significance, inconsistent with the prior hypothesis. This would be due to the fact that, in Thai society nowadays, both men and women share equal rights, as stated in Article 30 of the Thai Constitution 1997. Women are playing greater roles, and working hand in hand with men. Some have been elected as Village Head, Kamnan, and members of the TAO Executive Committees, the House of Representatives and also the Senate. Some have taken key positions in government agencies, such as District Director, Provincial Governor, Director General, Permanent Secretary, including Minister. Hence, it is possible for the TAO Executive Committees in different genders to play different roles in sustainable management of natural resources, with statistical significance. This is consistent with the research findings of Sumonta Loppai (2000: 104-116). Undertaking research on Public Awareness in the Conservation of the Damnoen Saduak Floating Market of Traders in Damnoen Saduak Canal, Ratchaburi Province, she found out that genders were not

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relevant to different public awareness in the conservation of the Damnoen Saduak Floating Market.

2.2 The TAO Executive Committees at different ages did not play different roles in sustainable management of forest, soil, wild animals, water and mineral, inconsistent with the prior hypothesis. In this study, most of the samples were in the age range between 41-50 years old (63.50 percent), as followed by 30-40 years old (23.70 percent), over 51 years old (9.60 percent), and below 30 years old (3.20 percent). Despite the different in ages, most of them had followed similar policies and legitimate roles. Therefore, those TAO Executives Committees at different ages did not play different roles in natural resources management, with statistical significance. The finding is consistent with the thesis conducted by Chonthicha Tang-an (1991: Abstract), concerning Knowledge, Belief and Practices of Housewives in the Disposal of Garbage: A Case Study of Households along the Saen Saeb Canal, Bangkok. She found out that most housewives possessed a moderate level of knowledge and practices in the disposal of garbage, without any significant differences.

2.3 The TAO Executive Committees in different occupations did not play different roles in sustainable management of forest, soil, wild animals, water and mineral, with statistical significance, not in line with the prior hypothesis. In this study, most of the samples were farmers (38.50 percent), as followed by self-employed (36.50 percent), traders (hired workers 9.00 percent). Most of them had lived in their respective community for more than 10 years (85.20 percent). Hence, they should know one another well, so their occupations did not affect their roles in sustainable

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management of natural resources, without statistical significance. This is consistent with research findings of Wipapen Juesakul (1993: A-B), concerning Garbage Management Behaviors of People in Central Districts of Bangkok. People in different occupations did not have different behaviors in garbage management with statistical significance. Yongyuth Poempoon (1999: 69), in addition, undertook a study on Knowledge and Attitude of People in Garbage Management of Muang Ang Thong Municipality. He also found out that people in different occupations did not have different knowledge and attitude towards garbage management, with statistical significance.

2.4 The TAO Executive Committees with different education levels played different roles in sustainable management of forest, soil, wild animals, water and mineral, with 0.05 statistical significance. Those finishing diploma and primary education played greater roles in sustainable management of natural resources than those holding education above BA level. This would be due to the fact that there were only four samples (2.60 percent) in this study, holding education above BA level. In addition, most of them aged under 30 years old, so they might have less experiences in managing local resources than those holding lower education. Of this study, there were 103 samples (or 66.00 percent) holding education at secondary and primary levels. Most of them aged between 41-50 years old. Many were born here, so they would be more willing to take good care of indigenous resource, when being elected as members of the TAO Executive Committees. This would be a main reason for those members of the TAO Executive Committees to play greater role in natural resources management than those holding educational level above BA, with 0.05 statistical

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significance. This is consistent with the research findings of Sumonta Loppai (2000: 116), concerning Public Awareness in the Conservation of the Damnoen Saduak Floating Market of Traders in the Damnoen Saduak Floating Market in Ratchaburi Province. She found that traders with different education levels possessed different levels of knowledge, practice and public awareness in the conservation of the Damnoen Saduak Floating Market, with 0.05 statistical significance.

2.5 Those TAO Executive Committees, having attended training on natural resources management, played different roles from those, having never attended such training courses, at 0.05 statistical significance, compatible with the prior hypothesis. Those having never attended training courses played greater roles than those having attended such courses. This would be due to the fact that those having never attended training courses were mostly the local people, so they would feel much closer to indigenous resources. When elected as members of the TAO, they pay greater attention to natural resources management. Those having attended training on natural resources management would consider it as part of regular duties of the TAO, already stated by law, so they expressed different opinions towards the roles in natural resources management, with 0.05 statistical significance.

5.3 Other Comments of TAO Executive Committees towards Sustainable Management of Natural Resources

3.1 Forestry

Most of the TAO Executive Committees, or 37.39 percent, considered there be measures to promote public awareness among children and the youth to intensively

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participate in natural resources conservation. Other comments, or 32.17 percent, were that the local leaders should participate in stringent enforcement of laws to protect natural resources. This would be due to the fact that most TAO Executive Committees had recognized long-term and sustainable benefits of forest. Hence, they considered it necessary to promote positive public awareness among children and the youth, so they can actively participate in the conservation of natural resources. For sustainability of natural resources, in addition, they found it necessary for local leaders to participate in stringent enforcement of laws.

3.2 Soil

The same is true for soil conservation, as most of the TAO Executive Committees, or 33.33 percent, found it necessary to promote public awareness among local people to effectively participate in natural resources conservation. Other comments, or 30.39 percent, suggested that the local people be provided with knowledge about soil conservation on a regular basis for the sake of sustainable development. This would be due to the fact that those local people might lack knowledge about proper preservation of soil. To promote popular participation in such a move, it is necessary to promote public awareness among them. In addition, regular and continuous training provision would enable the local people to adopt sustainable practices for soil conservation.

3.3 Wild Animals

Most of the TAO Executive Committees, or 40.66 percent, found it necessary to promote effective set-up of a conservation group, and the group itself should be

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more stable. In addition, some of them, or 31.87 percent, considered stringent imposition of laws necessary. This would be due to the fact that they had witnessed rapid deterioration of the local forest areas, from 7,226,250 rai, or 59.34 percent of the total provincial areas, to 6,713,750 rai, or 55.13 percent of the total provincial areas. The depleted forest areas would affect the number of wild animals. Hence, for the sake of sustainable conservation of wild animals, there should be conservation groups in the local areas, together with the more stringent legal enforcement.

3.4 Water

Most of the TAO Executive Committees, 46.27 percent, paid greater attention to the promotion of thrifty uses of water. Of about 35.82 percent found it necessary to promote public awareness in water conservation among the local people. This would be due to the fact that water shortage is one of the alarming problems in the local areas. Rapid deterioration of forest areas is also another major attribute. Some mines in the Province also released wastewater into natural water ways, thus causing water pollution. Hence, they considered it necessary to regularly promote public awareness in water conservation among the local people.

3.5 Mineral

Most of the TAO Executive Committees, 51.92 percent, suggested relevant government agencies to strictly enforce the laws against those mines polluting natural water ways. Others, or 40.38 percent, suggested there be measures to promote public awareness among children and the youth concerning natural resources conservation. This would be due to the fact that the TAO Executive Members were mostly the local

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people, having lived in respective Tambon for around 10-20 years, or 39.70 percent. Over 45.50 percent of them had lived in respective Tambon for over 20 years. In this research, 85.20 percent of the samples had lived in the communities for more than 20 years, so they had better understanding towards the current situation of mineral resources. Stricter enforcement of laws should be undertaken, against those mines now polluting the natural water ways. In addition, there should be measures to promote public awareness among children and the youth in order to recognize the importance of sustainability of mineral resources in the local areas.

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CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

Amid the rapid deterioration of natural resources, at present, only the maximization of uses of natural resources, with minimized effects on the environment, is no longer adequate. It is of great necessary to rehabilitate or rebuild depleted natural resources and the environment. These are part of the natural resources conservation. Kasem Chankaeo (1981: 100) states that "a main thrust for natural resources conservation is to maintain natural resources for long-term utilization."

In the Ninth Economic and Social Development Plan (2002-2006), in addition, the government has laid down principal visions and directions for strategic management of natural resources and the environment (2000: 33-34). The process of conservation and rehabilitation of natural resources and environmental management should rely greatly on intensive participation of local people and communities. They should be encouraged to take part in the move, through effective measures to create public awareness, to prevent and reduce problems, and to share expenses.

Through this means, the government promulgated the Tambon Council and Tambon Administrative Organization Act 1994 (Royal Gazette, 1994: Chapter 53A). This was aimed chiefly to promote the delegation of administrative power to the local people, seen as an effective way to empower the local people and people's organizations. The Tambon Administrative Organization (TAO) is part of such a

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move. It will be responsible for the development of local economy, society and culture. Its main duties are to provide and maintain road and water transportation routes, maintain cleanliness, prevent and control communicable diseases, prevent and relieve disasters, provide education, promote the development of children, women, the youth, the elderly, and the handicapped, as well as protect and maintain natural resources and environment, etc.

Recognizing such important roles and responsibilities of the TAO, the author undertakes the study on the roles of the TAO Executive Committees in sustainable management of natural resources in Kanchanaburi Province.

It is a survey research, by nature. The purposive sampling method is used to collect data from 156 samples, who are the TAO Executive Committees in Kanchanaburi where there are five major types of natural resources selected for the research. The data are collected by using questionnaires, with a level of confidence of 0.98, divided in three main parts, as follows:

Part 1 General information on the TAO Executive Committees

Part 2 The roles of the TAO Executive Committees in sustainable management of natural resources

Part 3 Other comments on the roles of the TAO Executive Committees in sustainable management of natural resources.

The author applies the SPSS/PC^{+} (Statistical Package for Social Sciences) to analyze the data.

1. Frequency and Percentage are used to analyze general information on the TAO Executive Committees.

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2. Mean and Standard Deviation (S.D.) are used to analyze the roles of the TAO Executive Committees in sustainable management of natural resources.

3. The t-test is used to compare two groups of variables concerning the roles of the TAO Executive Committees in sustainable management of natural resources. The One-way Analysis of Variance is used to analyze data with more than two groups of variables. The dual testing through the Scheffe' test is used in case there are significant differences. The research findings are presented through tables and essays, which can be summarized, as follows:

6.1 Conclusion of Research Findings

1. Personal and general information on the TAO Executive Committees in Kanchanaburi Province, selected as samples in this research.

As for general information, most of the training courses on natural resources management, as attended by the TAO Executive Committees, are concerned with forestry, or 23.70 percent. This was followed by water, soil, wild animals and minerals, or 23.70, 19.20, 11.50 and 5.10 percent, respectively.

Regarding personal information in this research, most of the samples were men, or 76.90 percent, aged between 41-50 years old, or 63.50 percent, and having lived in a respective Tambon for more than 20 years, of about 45.50 percent. Most of them, or 38.50 percent, were farmers. As for educational levels, most of them, or 39.10 percent, finished secondary education, and 66.00 percent of the samples used to attend training courses on natural resources management.

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Furthermore, the research findings showed that most of the selected TAO Executive Committees exposed themselves to information on natural resources and environmental management on a daily basis. Sources of information, according to the study, were TV (17.30 percent), radio broadcasting (10.30 percent), newspapers (14.70 percent), government news (7.10 percent), textbooks/journals (0.60 percent), and conservation (11.50 percent). Exposure to those media could be averaged as 3-4 times a week, 1-2 times a week, 1-2 times a month, or never.

2. The roles of the TAO Executive Committees in Sustainable Management of Natural Resources

In general, the TAO Executive Committees played moderate roles in sustainable management of forest and water resources. They played only minimal roles in the management of soil, wild animals and mineral resources.

3. Testing of Hypothesis

3.1 The TAO Executive Committees at different ages did not play different roles in sustainable management of natural resources.

3.2 The TAO Executive Committees at different ages did not play different roles in sustainable management of natural resources.

3.3 The TAO Executive Committees with different occupations did not play different roles in sustainable management of natural resources.

3.4 The TAO Executive Committees with different educational levels did not played different roles in sustainable management of forest, soil and water. Their roles were indifferent for the management of wild animals and minerals.

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3.5 The TAO Executive Committees, with different experiences in training on natural resources management, played different roles in the management of soil. However, they did not play different roles in the management of other resources.

6.2 Recommendations

1. The TAO Executive Committees played moderate roles in the management of forest and water, while playing only minimal roles for the management of soil, wild animals and minerals. Hence, relevant public and private sectors should provide education and training on sustainable management of natural resources to the TAO Executive Committees, so they can develop good knowledge and attitude to achieve the highest efficiency and effectiveness in natural resources management.

2. It is necessary to promote public awareness in natural resources conservation among children, the youth, and the general public, through formal and informal education systems. This would lead to greater responsibility of and participation in sustainable management of natural resources.

3. Relevant government agencies should disseminate information on sustainable management of the environment to the general public, so they will recognize adverse consequences from natural resources deterioration. Such information can be disseminated via radio broadcasting, TV, newsletter, pamphlets and exhibition, etc.

4. Relevant agencies should organize seminars of local leaders, i.e., Kamnan, Village Heads, Chiefs of Tambon Municipality, the TAO Executive Committees, and

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religious leaders. These local leaders can play greater roles in sustainable conservation and management of natural resources for the mutual benefits in the local areas.

6.3 Recommendations for Further Studies

1. It is necessary to undertake studies on participation of local people in sustainable management of natural resources in Kanchanaburi Province.

2. There should be further studies on the roles of the TAO Executive Committees in sustainable management of natural resources on national scale.

3. There should be further studies on public awareness of local people in sustainable conservation of natural resources.

4. It would be proper to study the roles of entrepreneurs of factories and mines in sustainable conservation of natural resources.

5. There should be studies on knowledge and attitude of students in both formal and informal educational systems concerning sustainable conservation of natural resources.

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APPENDIX

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Questionnaire
on
Roles of the Executive Committees of the Tambon Administrative Organizations in Sustainable Management of Natural Resources in Kanchanaburi Province

Instruction

The questionnaire is part of the study on the Roles of the Executive Committees of the Tambon Administrative Organizations in Sustainable Management of Natural Resources in Kanchanaburi Province. Could you please provide information compatible with your actual roles as an executive official of your organization. All information will be kept confidential, which will not affect your performance in office. Any findings derived from the research will be used as guidelines for development and enhancement of the Executive Committees of the TAO in order to achieve the highest efficiency in sustainable management of natural resources in the future.

The questionnaire comprises three main parts, i.e.,

Part 1 General information of the TAO Executive Committees

Part 2 Roles of the TAO Executive Committees in Sustainable Management of Five Sectors of Natural Resources, i.e., forestry, soil, wild animals, water and mineral.

Part 3 Open-ended questionnaire concerning other comments of the TAO Executive Committees on Sustainable Management of Natural Resources in Kanchanaburi Province.

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Part 1 General Information on TAO Executive Committees Instruction Please mark (✓) in ☐, which in line with your actual information.

1. Gender
2. Age years old
3. Period of living in the Tambon years
4. Main Occupation
   Extra Occupation
5. Educational Level
6. Have you ever attended training on natural resources management? (Please identify, able to tick more than one answer)
   ☐ Forest ☐ Water
   ☐ Soil ☐ Mineral
   ☐ Wild Animals
7. Frequency of media exposure concerning natural resources management. (Able to tick more than one answers)

	Daily	3-4 times /Week	1-2 times /Week	1-2 times /Month	Never
7.1 TV					
7.2 Radio Broadcasting					
7.3 Newspapers					
7.4 Government News					
7.5 Textbook/Journal					
7.6 Daily Conversation					

Part 2 Roles of the TAO Executive Committees in Sustainable Management of Five Sectors of Natural Resources, i.e., Forest, Soil, Wild Animals, Water and Mineral.

There are six levels of practices, i.e., most-practiced, more-practiced, moderate-practiced, less-practiced, least-practiced, and never-practiced.

Natural Resources Management	Never	Levels of Practices				
		Least	Less	Moderate	More	Most
Forestry						
1.Relevant parties designate vision, project framework and strategies for sustainable management of forestry						
2.There are concrete operational results of plans and projects.						
3.Opportunities are provided for local people and communities to participate in sustainable management of forestry.						
4.Government agencies are encouraged to develop management mechanisms for forestry.						

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Natural Resources Management	Never	Levels of Practices				
		Least	Less	Moderate	More	Most
5.Private agencies are encouraged to develop management mechanisms for forestry.						
6.There are campaigns and dissemination of information to promote public awareness in forest preservation in a more systematic and sustainable manner.						
7.Local wisdom is promoted for forest preservation.						
8.Conserved and green areas are designated in the local areas.						
9.Eco-system zoning is conducted by taking into consideration the cultural and traditional diversities in the local areas.						
10.Group or core group is established to enhance sustainable management of forestry.						
11.Community networks have been established in order to acknowledge legal rights to know and utilize bio-diversities.						
12.Depleted forest areas have been rehabilitated.						
13.TAO coordinates with relevant agencies in sustainable management and preservation of forest.						
14.There are strict legal enforcements to suppress encroachment into forest areas.						
15.Children and the youth are encouraged to participate in sustainable management of the local forest areas.						
Soil						
16.Relevant parties designate vision, project framework and strategies for sustainable management of soil.						
17.There are concrete operational results of projects and plans.						
18.Opportunities are provided for local people and communities to participate in sustainable management of soil.						
19.Government agencies are encouraged to develop management mechanisms for soil.						
20.Private agencies are encouraged to develop management mechanisms for soil.						
21.There are campaigns and dissemination of information to promote public awareness in soil conservation in a more systematic and sustainable manner.						
22.Local wisdom is promoted for soil conservation.						
23.Land use zoning is conducted, compatible with potential and environmental sustainability.						
24.Group or core group is established to enhance sustainable management of soil.						

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Natural Resources Management	Never	Levels of Practices				
		Least	Less	Moderate	More	Most
25.Community networks have been established in order to acknowledge legal rights to know and utilize bio-diversities.						
26.Depleted land has been rehabilitated.						
27.There are measures to prevent and alleviate soil erosion problems.						
28.There are measures to protect and make use of land in certain areas with the prominent ecological and geological qualities, based on balance in eco-system.						
29.There are strict legal enforcement to suppress encroachment into protected areas.						
30.Children and the youth are encouraged to participate in sustainable management of soil.						
Wild Animals						
31.Relevant parties designate vision, project framework and strategies for sustainable management of wild animals.						
32.There are concrete operational results of projects and plans.						
33.Opportunities are provided for local people and communities to participate in sustainable management of wild animals.						
34.Government agencies are encouraged to develop management mechanisms for wild animals.						
35.Private agencies are encouraged to develop management mechanisms for wild animals.						
36.There are campaigns and dissemination of information to promote public awareness in wild animals preservation in a more systematic and sustainable manner.						
37.Local wisdom is promoted for wild animals preservation.						
38.Group or core group is established to enhance sustainable management of wild animals.						
39.Community networks have been established in order to acknowledge legal rights to know and utilize bio-diversities.						
40.There are measures to preserve, rehabilitate and develop wild animals for the sake of balance in eco-system.						
41.There are strict legal enforcements to protect and suppress illegal poaching.						
42.Children and the youth are encouraged to participate in conservation of wild animals.						
43.TAO Coordinates with other agencies involved in sustainable conservation and management of natural resources.						

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Natural Resources Management	Never	Levels of Practices				
		Least	Less	Moderate	More	Most
Water						
44.Relevant parties designate vision, project framework and strategies for sustainable management of water.						
45.There are concrete operational results of projects and plans.						
46.Opportunities are provided for local people and communities to participate in sustainable management of water.						
47.Water is provided in line with the needs of people.						
48.There are sound control and maintenance of water quality, pollution and drainage system.						
49.Government agencies are encouraged to develop mechanisms to supervise and manage water resources.						
50.Private agencies are encouraged to develop mechanisms to supervise and manage water resources.						
51.There is sustainable mechanism to protect and reduce destruction of watershed areas.						
52.There are campaigns and dissemination of information to promote public awareness in conservation of water resources.						
53.Local wisdom is promoted for water conservation.						
54.There are measures to designate proper uses of water in various activities on a systematic and thrifty basis, consistent with potential and the environment.						
55.Group or core group is established to enhance sustainable management of water.						
56.Community networks have been established in order to acknowledge legal rights to know and utilize water resources.						
57.Depleted water resources have been rehabilitated for sustainable uses.						
58.There are strict legal enforcements to protect and suppress encroachment into water resources.						
Mineral						
59.Relevant parties designate vision, project framework and strategies for sustainable management of mineral resources.						
60.There are concrete operational results of projects and plans.						
61.Opportunities are provided for local people and communities to participate in sustainable management of mineral resources.						

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Natural Resources Management	Never	Levels of Practices				
		Least	Less	Moderate	More	Most
62.Government agencies are encouraged to develop mechanisms for sustainable management of mineral resources.						
63.Private agencies are encouraged to develop mechanisms for sustainable management of mineral resources.						
64.There are campaigns and dissemination of information to promote public awareness in conservation of mineral resources.						
65.Conservation and utilization zones have been designated.						
66.There are clear measures to control and preserve utilization of mineral resources.						
67.There are measures to control releases of heavy metal substances into public water resources.						
68.Group or core group is established to enhance sustainable management of mineral resources.						
69.Community networks have been established in order to acknowledge legal rights to know and utilize mineral resources.						
70.There are strict legal enforcements to protect and suppress encroachment into and destruction of mineral resources.						

Part 3 Other Comments on the Roles of the TAO Executive Committees in Sustainable Management of Natural Resources in Kanchanaburi Province

Management of Forest
Management of Soil
Management of Wild Animals
Management of Water
Management of Mineral

Your cooperation is highly appreciated.
Pol.Lt. Pongsakorn Ooppapong
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