# THE MITIGATION OF SALTWATER INTRUSION IMPACT BY FOLK WISDOM IN PHON SUNG, BAN DUNG, UDON THANI, THAILAND

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**Abstract -** The research aimed to study impact of saltwater intrusion and The mitigation of saltwater intrusion impact by folk wisdom in Phon Sung, Ban Dung, Udon Thani. The samples of research are 10 people by using Semi-structured interviews.The samples were purposive sampling included community leaders, philosophers, villagers. And people affected by the invasion of salt water. The results showed that the impact of saltwater intrusion are divided into the following aspects: Economic impact, Farmers cannot cultivate a variety of economic crops, resulting in limited revenue streams. And obstacle to agricultural development. Social impact, Conflicts in Entrepreneur inhabitant and Farmers in the case of salt water influx into the area. Environmental impact, Biodiversity is limited. There are no plants and animals living in salty areas. Many freshwater species such as shrimps, crabs, crabs, fishes are extinct. Agricultural crops dead etc. For The mitigation of saltwater intrusion impact are 1. Digging ponds to keep saltwater from spreading in neighboring areas. 2. Washing out of Saline from rice fields using rainwater or irrigation water. 3. Selection of rice varieties and economic crops suitable for saline soil. 4. Fish farming that can tolerate salinity to generate income such as Red Tilapia etc. 5. Use of Legal Measures to Prevent and Suppress Smuggling in release saltwater in to the public watercourses.

**Index Terms -** Mitigation, intrusion, folk wisdom, saltwater

## I. INTRODUCTION

The problem of the production of rock salt is likely to intensify in many areas in the northeast of Thailand. Cause environmental effects such as effects of salinity on contamination in freshwater and surface water sources. The soil and water deteriorate due to salinity spread. And affect to the career of the people especially in the field of agriculture such as The low productivity of the crop results in economic, social, quality of life and the overall environment of the area. It also has an impact on the state of mind and well-being of people who are based near salt fields because of the fear of collapse of the land caused by the salt hollow.(Peangtha,2003) Currently, salt production in the Northeast region continues to create problems for the environment. especially The problem of salinization is the obstacle to agricultural development which created problems for agricultural professionals and make problems for water resources that are likely to be depleted in the future.( Department of Mineral Resources, 2009:86-93).

The problem of saline soils that occur in many areas in the Northeast. There are many departments trying to solve problems, especially government agencies, such as the Department of Mineral Resources. Efforts have been made to resolve the problem to the affected people by create a knowledge base to solve the problem of saline soil for sustainable community and local to use for better living.( Phusit,2017) However The problem of saline soils still affects the way people live in many areas. One of them is the area of Phon Sung, Ban Dung. UdonThani Province. It is the area where the production of rock salt in the country. The problems caused by the salt overlay rice fields. They also have poor protection and management. Saline soil in Ban Dung Damage caused the soil to deteriorate. Some areas cannot be restored to normal. And cause a dispute between the operators of salt. And the rice growers. (Nuchit, 2012)

The objective of research

1. Study on the impact of saltwater intrusion on Phon Sung, Ban Dung, UdonThani
2. Study The Mitigation of Saltwater Intrusion Impact by Folk Wisdom in Phon Sung, Ban Dung, UdonThani

## II. LITERATURE REVIEW

### A. Introduction to Saline Soil

Saline soil is a soil that has too much salt dissolved in the soil solution and affects the growth and yield of the plant. Because the plant is dehydrated. And toxic ions accumulate in plants too. It also causes an imbalance of plant nutrients.

Saline soil in the Northeast. Usually occurs in lowlands. Observed from the surface patches of salt in the rainy season. Salt land on the upper floor will be washed down rainwater in the ground floor. And the salt will return to the ground surface inthe new drought by issolved in the evaporated water to fill the voids of the soil and then crystallize on the soil surface. Provinces found saline soil such as Nakorn rachasima, Khonkean, Chaiyaphum, Roi Et, Udon Thani, Sakon Nakhon, Nakhon Phanom, Surin, Buriram, Yasothon, Ubon Ratchathani. Distribution of saline soils in the Northeast. The salinity level was classified into 3 levels as follows:

- High saline soil ;A salt-affected area is visible on the surface throughout the area. The salt found on the

surface. Scattered in more than 10 percent of the area. This area will not grow crops. Often abandoned Modifications need to be high investment.

- Moderate salinity; A salt area is visible on the some surface in the area. The salt found on the surface. Scattered in 1- 10 percent of the area. Crop production is low, discontinuous, with an area of approximately 3.7 million acres.

- Low saline soil;The area is covered with salt, so noticeable in the dry season. The salt found on the surface. Scattered in 1 percent of the area. Groundwater is brackish or saline water. It is more than 2 meters deep from the surface. This area is mostly used for farming. The total area is about 12.6 million acres.

**B. Distribution and Occurrence of Saline Soil in the Northeast.**

**Natural factors:**

1) It is a lowland area with a surface level below the basin.

2) The area is cratered across the crust. Ground water penetrates easily into the soil surface.

3) It is located near the surface of the salt. It causes the salt to dissolve hugely.

4) It is an area with extensive deforestation. Rainfall can penetrate into the soil more. As a result, the level of underground saline. The influence of gravity on the capillary force. Salt can spread to the top soil. The composition of the water in the groundwater salts that spread to the surface. To be evaporated into the air. The salt is left at the surface. And the volume is increasing. When these processes take a long time. Many salts appear on the surface.

**Human factors:**

Effects of other human actions such as Dam construction in areas where there is no suitable hydrological. The groundwater level in the area was raised. The lack of academic excellence and the lack of effective wastewater management. The spread of saline water to the lowlands and rice fields that have not encountered salt problems before.

## III. RESEARCH METHOD

Data were collected by qualitative research including Semi-structure Interview and Non-participant Observation. Target groups used in the study are community leaders, philosophers, villagers. And people affected by the invasion of saltwater. The data from the study to conclude discussions in accordance with the purposes and presented in the form of a discussion.

## IV. RESULT

Phon Sung is located in the eastern part of Ban Dung. North to Ban Muang district. South of Ban Tat and Amphoe. East adjacent to Ban Muang. West adjacent to Sri Suttho. The distance from Udon Thani is 81 kilometers and the distance from Bangkok is 636 kilometers. General information of Phon Sung There are 17 villages with a population of 11,320. 5,717 men and 5,603 women (data as of year 2016). The main occupation of the people is growing rice, sugar cane, rubber, salt.Extra job is livestock and mercenaries.




**Fig.1 Map of Phon Sung, Ban Dung, Udon Thani**

Phon Sung has a total area of 38,852 acre. There were 33,058 rai of agricultural area including farmland, perennial crops, vegetables, flowers, ornamental trees, rubber, palm oil and other agriculture. 2,102 rai of water resources. There are 641acre 732 square meters of salt fields.In the area of Ban Fang. Ban Phon Sung Nua Baan Poon Sung Tai. And there are important streams flowing through, including Huai Klang, Huai Sang and Huai Lueua.




**Fig.2 Land use of Phon Sung, Ban Dung, Udon Thani.**



**Fig.3Salt field in Phon Sung, Ban Dung, Udon Thani.**

From the variety of land use to farming consists of rice farming Horticulture growing crops and salt making. Researcher found that farmers in some area have the problem about impact of salt intrusion caused by salt as follows.

1) Social impact; There is a conflict between salt producers and farmers who have been affected for decades. Changes in the way of life of gardeners and farmers. Part of them abandoned their rice fields, their seasonal crops and turned to general labor in the Udon Thani district and in the provinces. One part turned to salted plants. And other economic crops.

2) Economic impact; Farmers cannot cultivate other vegetables and crops. Resulting in loss of income. Loss of opportunity for main occupation and supplemented occupation, by cultivation of other agricultural produce in and out farming season because of Stunted yield Growing up is not complete and or falling. And also cannot No fishing can be done during the rainy season and dry season. Cannot use natural resources for consumption.

3) Environmental impact; Ecosystem change, the salinity in the creek has resulted in shrimps, shrimps, and crabs are abundant. The size Aquatics are smaller. Some species are extinct.

The problem of the impact of salinity intrusion in the area of Phon Sung. Researcher found a relief model with folk wisdom as follow, 1) Digging ponds or small ponds to keep saltwater from spreading in neighboring areas. 2) Saline washing out of rice fields using rainwater or irrigation water. 3) Selection of rice varieties and economic crops suitable for saline soil. for example, rubber, Eucalyptus and Fish farming that can tolerate salinity to generate income such as striped bass 4) Legal Measures for Preventing and Suppressing the Release of Salt Water in Public water resources such as canals, swamps, canals.



**Fig.4 The Mitigation of Saltwater Intrusion Impact by Folk Wisdom in Phon Sung, Ban Dung, Udon Thani**

## CONCLUSION AND SUGGESTION

## CONCLUSION

The Saltwater Intrusion Impact in Phon-Sung area is composed of the social impact of conflicts between salt producers and affected farmers. Changes in the way of life of farmers and gardeners. The economic impact is that farmers cannot grow crops and other crops. Resulting in loss of income. Loss of opportunity in primary and extra occupations both in and out farming seasons. Environmental impacts include changes in aquatic ecosystems, organisms such as shrimps, clam, crabs, fishes, are smaller than before. Some species are extinct. According in Pennapa Palapin (2017) found that The intrusion of saline water in the area of Ban Dung, Udon Thani ProvinceIt is a problem in the development of the area and affects the people.The economic problem is that the people lack the opportunity to earn income from various land uses.Social problemsis that Relocation and conflicts between salt producers and farmers in affected areas. Change of farmer's career to a worker in a city. Environmental impact is changes in soil ecosystems. Aquatic ecology Freshwater becomes brackish water. Soil is saline soil. Many plants has wither, perennial die, many aquatic are extinct. Consist with Prasit Kunanut and Saksinvanich (2002: abstract).

The impact of salt production on the economy is that the community is working to reduce the problem of labor migration and community economy.However, there is a social impact, conflict and ecosystem impact that are difficult to solve is the spread of saline soils affect agriculture. Fisheries and settlement of land.

Mitigation model The wisdom of the villagers in the area of Poon Sung is to dig a pond or small ponds to keep salt water from spreading in neighboring areas. Washing out saline soil of rice fields using rainwater

or irrigation water. Rice selection And economic crops suitable for saline soil such as rubber, eucalyptus. Fish farming that can tolerate salinity to generate income such as striped bass. And Legal measures To prevent and suppress the saltwater in public water.According in Phusit Phukamchanod (2017) suggest the proposed solutions to tackle the problem of salt water intrusion from the production of rock salt in Ban Don District, Udonthani Province by the true contribution is that people must adapt to the ever-changing state of the affected not only population, entrepreneurs and government officials directly responsible, but also Finding new innovations or new products for add value the salt. But it must come from the needs of the people, both the entrepreneurs and the people in the affected area.

## SUGGESTION

Encourage the civil society in the area of Poon Sung to be truly involved in all processes by Cooperate with local authorities and / or agencies at all levels to tackle integrated issues, by promoting the development of paddy fields and saline to lead to sustainable development. Innovate together to be able to take advantage of saltwater, saline soil maximum. By bringing local wisdom as a base and using a variety of techniques. Such as Developed local technology and other advanced technologies to solve the problem.Develop affected area to have a chance to make money. And to live together happily.

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