WATER AND SUBAK IRRIGATION SYSTEM IN BALI
Wayan Windia
Head of Subak Research Center, Udayana University, Bali
Email: wayanwindia@ymail.com
Gede Sedana
Staff of Subak Research Center, Udayana University/Lecturer at Faculty of Agriculture, Dwijendra University, Bali
Email: gedesedana@yahoo.com
Sumiyati
Secretary of Subak Research Center, Udayana University
Email: sumiyatiftpunud@gmail.com

ABSTRACT
Subak is farmers managed irrigation system which has an irrigation water source, irrigated to certain compound of rice fields, and has a particular temple. Subak is autonomy traditional institution in Bali. Aside managing irrigation water, the most important thing found in subak system is ritual ceremony activities. It is supporting the morale of farmers and subak in conducting farming work on the rice fields. Another aspect supporting the strengthen of subak is the strong interest among the members to manage irrigation water.

The objective of this paper is to introduce some ritual activities performed within subak system. The ritual ceremony is a part of important thing of Tri Hita Karana (THK) implementation, namely parhyangan aspect presenting the harmonious relationship between farmer and the God. Ritual, also presenting the farmer respect to the water (irrigation water). The other components of THK are pawongan (the harmonious relationship among farmers as subak's members) through the implementation of subak's regulation (awig-awig); and palemahan presenting the harmonious relationship between farmer and environment through the rice field terrace maintenance. So, subak activities in Bali is a symbol of implementation of Tri Hita Karana philosophy.

There are 16 activities of ritual ceremonies individually performed by farmer as subak’s member starting from the ritual of fetching irrigation water until the post-harvest ritual ceremony. Aside from this, there are also ritual ceremonies conducted by the all subak members at the subak level. Subak also has ritual ceremonies carried out together with the other subaks in the temples located near the dam, lake and others. These ritual activities constitute as a cultural practices conducted by subak, and indicate the respecting of farmers and subak for the water existence. Therefore, subak has been regarded as the keeper of Balinese culture by implementing THK, thus UNESCO has acknowledged subak as world cultural heritage.

Key words: water, subak ritual, Bali culture, UNESCO.

INTRODUCTION
Basically, subak is farmers’ manage irrigation system, at certain area of rice fields (with natural bounderies), getting water from certain sources, having subak temple, and autonomy (Windia and Wiguna, 2014). Autonomy means that subak free to do any activities internally and externally. Subak is
not under control of government village or Bali traditional village. Yet subak always get close coordination with those government village and Bali traditional village because the farmers as a member of subak, are also the member of government village and as a member of Bali traditional village, where the farmers stay. These are the main characteristic of subak system. Even though there are regulation of Bali Government No. 2, year 1972 and No. 9 year 2012, those, however, do not give clear definition about subak, that is, not yet explaining the closed relation of subak with the source of water. Anyway, subak is very closed related to source of water and rice fields. If no source of water and rice fields, there will be no subak anymore. That is way, subak is regarded as a system of subak or is completely called as a subak irrigation system.

The subak irrigation system in Bali has been established since around 1000 years ago, or its existence has been known on the inscription since 1071 (Purwitha, 1993). It is worthnoty that subak irrigation system could not be separated to the Kings’ roles in Bali Island, especially the attention of the king to the agricultural sector. For example, it was noted that the role of the King of Udayana Warmadewa (at the golden era of the Ancient Bali Kingdom) is very clear, when he built rice fields and subak at the upstream of Pakerisan River at Tampaksiring area, that is Subak of Pulagan. This is now recognized by UNESCO as world cultural heritage. The subak irrigation system had been grown in line with the policy that had been taken by the kings toward agricultural sector and the subak organization. Nowadays, subak system has been fully influenced by the role and policy of government. Pusposutardjo (1996) states that this situation as a transformation process of irrigation system (including subak system) toward its social environment.

During this time, the transformation has been occured at the subak irrigation system in Bali, as follows.

(i). Management aspect. Previously, the subak system only managed irrigation water affair for the members. But because of the economic activity in its surrounding, several subaks are now working on the financial and economic aspects, too (ie : Subak Guama, at Tabanan Regency). Income of subak generally comes from from members’ contributions, payment from inactive subak members, and payment of duck roaming on the rice field after harvesting, and small portion from the sanctions of internal bylaws (Sutawan dkk, 1989 dan Sumarta, 1992). In addition, subak has begun to manage farmers’ cooperative under the subak system (Windia, 2014 and Suamba, 2012).

(ii). Institutional aspect of subak. Subak institution has been developed, because of the unification of several subaks to be subak coordination body (called subak-gede), and the unification of subak and subak coordination body along the river to be subak federation or subak-agung.

(iii). Institutional system of subak. When the domain of subak management is only on irrigation, the organization structure of subak system consists of the board of subak, members, and the priest only. But nowadays, the structure has developed to be some additional ones such as the duck owner, farmers’ cooperative, and government.

Those cited explanations indicate that the existence of subak has been developed until now due to institutional development and economical activity of subak. Therefore, these should be empowered in line with its strategic environment in order that subak might provide better services to memmbers. This should be assessed since subak has many institutional and economic challenges that might threat its existence.

RITUALS AND SUBAK IRRIGATION MANAGEMENT
Principally, the irrigation management of subak system is based on harmony and togetherness. The two principles are the core of Tri Hita Karana (THK) philosophy as a based of subak activities. THK is a philosophy that supervises the people to do harmony between human being and God (*parhyangan* aspect); harmony between human being and others (*pawongan* aspect); and harmony between human being and nature (*palemahan* aspect). This philosophy is implemented by subak on organizational and water irrigation management.

The Balinese society believes that water is a symbol of Goddess Wisnu. So the subak very respect with water existence. At every subak, it is always built temple/pura for respecting Goddess Wisnu, and called Temple of Uluncarik. The existence of water is for growing rice at rice fields. Rice is a symbol of Goddess Sri. So, for respecting Goddess Sri, the subak built Temple of Bedugul. Meantime, the Balinese believe that Goddess Sri is a wife of Goddess Wisnu. Due to this belief, subak usually build Temple of Bedugul in one complex area as a holy place for the Goddess of Wisnu and Sri. This might make more efficient.

When the farmers will start doing land preparations, they will conduct *magpag toya* ceremony (picking water ceremony) at the water source of subak (located at the river, water division, or water spring). Other ceremony is also conducted at subak’s temple, and shrine owned by individual farmer built at every plot of rice fields area.

In subak system there are ceremonies for water (Goddess Wisnu) and rice (Goddess Sri) as the two are interrelated and respected. Farmers in Bali very respect to Goddess Wisnu and Goddess Sri by giving offerings through ritual ceremonies. There are some ritual ceremonies performed by farmers on their own rice fields and at the subak level. Sutawan (2008) noted type of individual ceremonies within subak system as shown in Table 1.

Table 1. Type of individual ritual ceremonies

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of ritual</th>
<th>Period</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Magpag toya</td>
<td>Starting to get water at source of subak water</td>
<td>To respecting water, that will be used for irrigation</td>
</tr>
<tr>
<td>2.</td>
<td>Ngendagin/memun gkah/nuasen Tedun</td>
<td>Starting to flow rice field</td>
<td>To have permission from the God (Fertility God living on the ricefield) that farmer is preparing the land for planting</td>
</tr>
<tr>
<td>3.</td>
<td>Pengwiwit/ngurit</td>
<td>Preparing seedling work</td>
<td>To wish to the God for having good seedling before transplanting process</td>
</tr>
<tr>
<td>4.</td>
<td>Nuasen Nandur</td>
<td>Transplanting of seedlings</td>
<td>To wish to have good transplanting and good growth of seedlings transplanted</td>
</tr>
<tr>
<td>5.</td>
<td>Ngulapin</td>
<td>After transplanting of seedling and there are seedling damage</td>
<td>To wish to the God in order that the rice crop will grow well</td>
</tr>
<tr>
<td>6.</td>
<td>Ngeroras</td>
<td>After 12 days transplanting</td>
<td>To wish to the God in order that the rice crop will grow well</td>
</tr>
<tr>
<td>7.</td>
<td>Mubuhin</td>
<td>After 15 days transplanting</td>
<td>To wish to the God in order that the rice crop will grow well</td>
</tr>
<tr>
<td>No.</td>
<td>Activity</td>
<td>Time Frame</td>
<td>Purpose</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------------</td>
<td>------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Neduh/Ngebulanin</td>
<td>After 35 days</td>
<td>To wish to the God in order that the rice crop will grow well</td>
</tr>
<tr>
<td>9</td>
<td>Nyungsung/ngiseh/ngebulan/dedinan</td>
<td>After 42 hari</td>
<td>To wish to the God in order that the rice crop will grow well</td>
</tr>
<tr>
<td>10</td>
<td>Biukukung/miseh/ngiseh</td>
<td>Starting flowering of rice</td>
<td>To wish to the God in order that the rice crop will grow well</td>
</tr>
<tr>
<td>11</td>
<td>Nyiwa Sraya</td>
<td>After flowering</td>
<td>To wish to the God in order that the rice crop will grow well</td>
</tr>
<tr>
<td>12</td>
<td>Ngusaba/ngusabanini/mantenin Dewi Sri</td>
<td>After the rice mature</td>
<td>To wish to the God in order that the rice crop will grow well and bring good yield</td>
</tr>
<tr>
<td>13</td>
<td>Mebanten manyi.</td>
<td>Preparing harvest</td>
<td>To wish to the God in order that the harvest bring good yield</td>
</tr>
<tr>
<td>14</td>
<td>Ngerasakin</td>
<td>After finishing harvest</td>
<td>To say thanksgiving to the God in which his harvest is good and prepare to have further planting</td>
</tr>
<tr>
<td>15</td>
<td>Mantenin</td>
<td>After storing harvested rice</td>
<td>To say thanksgiving to the God in which farmer could storage the harvested rice</td>
</tr>
<tr>
<td>16</td>
<td>Ngerestiti/Nangluk merana</td>
<td>If there is vulnerable diseases</td>
<td>To wish the God in order that there is no past and diseases any more</td>
</tr>
</tbody>
</table>

The explanation cited above indicates that water management in subak implemented under parhyangan aspect. Moreover, the activity of making subak’s regulation, called awig-awig is related to pawongan aspect. The content of awig-awig usually consists of every thing that must do and must not do in the farming activities, particularly on the process of water borrowing among the farmers; ritual ceremonies; and planting schedules, and others. There is a sanction fined to farmer who does not follow the regulation. Sanction would be decided on the subak’s meeting based on the consensus among members. Subak meeting is usually held at least once a month depending on the urgency of activities. This meeting is always conducted before the land preparation started. If subak has economic activities (cooperative), so the meeting will be held regularly every month, in order to collect money interest from subak members, and other internal issues of subak.

At the palemahan aspect, irrigation water flowing to rice field is managed by subak’s members under the one inlet and one outlet system. The irrigation water might not flow directly from the rice field of one farmer to the other farmer’s rice field. At the compound of farmer’s rice fields, a farmer has one inlet, where the water enters. Then, the water will be used for the all blocks of rice fields, until the last block of their rice field before flowing to drainage through the outlet, where the water will out to the canal. The benefit of the one inlet and one outlet system is the farmers will have water borrowing system among themselves through their own inlets. After approval, the farmer will close the water at the inlet, and water will flow to the other farmer’s inlet. No fee and no money compensation in this borrowing system. Just borrow, if needed and the other farmer agrees. That is the symbol and implementation of harmony and togetherness at the subak system. Another benefit of one inlet and one outlet system is the farmer can manage the cropping system in one plot of their rice field. The farmer can irrigate at the rice field that he will grow rice. Otherwise the farmer will not irrigate one or several block of their rice fields if they will grow second crops (vegetables, flower, beans, etc). So, the farmer can manage the water individually at their rice field, through one inlet and one outlet system.
The entire activities of subak regarding irrigation water management in terms of parhyangan, pawongan and palemahan aspects are aimed at making harmony and togetherness within subak organization. That is an evident that subak’s members directly implement the Tri Hita Karana philosophy in every day life of subak. That is why subak has been recognized by UNESCO as world cultural heritage with a theme: Cultural Lanscape of Bali Province : Subak as Manifestation of Tri Hita Karana Philosophy.

PROBLEMS ENCOUNTERED BY SUBAK IN BALI

Arising problems within subak system in Bali are related to tourism development activities. The development of tourism has brought about massive conversion of rice fields, with an average 750 ha/year. Even though the existence of rice fields and subak are very important to Bali culture and tourism sector, but there has not implemented yet the strategic and real efforts to sustain the subak, rice fields and agriculture in Bali relating to tourism development. A fact that contribution from trade, hotel and restaurant toward PDRB is high. Meanwhile, the contribution of agricultural sector to the economical of Bali is decrease.

The Bank of Indonesia Bali Province always does regional economical and financial study. In the second three months of 2014, it was indicated the marginalization of agricultural sector rather than tourism sector. Therefore, why we have to develop tourism development in Bali, let alone reclamation?. The government must have programs to support marginalized economic sector, such as agricultural sector. If not, the economic of Bali will be dominated by capitalistic sector, and the weak sector (agricultural sector) will always decrease and decrease; and the rich will be richer.

In 2014, the development growth of agricultural sector was only 0.02%, while it was 2.22% in 2011. Meantime, the tourism sector was increased more than 8%, such as it was 8.43 % in 2014, and 8.69% in 2011. At those economical situation, the poverty in Bali was increased by 0.04% (March 2014) compared to 2013. The poor household in Bali was 185,200 household in 2014. According to the Bank of Indonesia Bali, the increasing of the poverty in Bali is caused by low growth development of agricultural sector. The high tourism development could not alleviate poverty people in Bali. It means that high growth of tourism development might not ensure to decrease poverty in Bali.

Product Exchange Value (PEV) of agriculture could be indicated a condition of farmers’ life in Bali. At year of 2014, the PEV of agriculture was decreased by 1.79 % compared to earlier year. The PEV is now 104.58, meanwhile the expenditure is 100. So, the income of farmers was very low. The PEV of food crops agriculture was under 100 indicating farmers got loss. So, the agricultural sector is very important to get help (subsidy and protection), in order that the farmers do not sell their ricefields. If not, this might make subak disappear, thus Bali culture will shock and destroyed.

It is noteworthy that the development growth of the tourism sector more than 8%  but according to the Bali Statistical Office, the rice fields in Bali was decreased 750 ha/year. Before year 2014, the Agriculture Service of Bali Province noted that the decreasing of rice field in Bali was 400 ha/year. During 2005-2009, the decreasing of rice field in Bali was eraage more than 1000 ha/year (the Bali Statistical Office (2010). Decreasing of rice fields area makes the number of farmer in Bali was also decreased. At year 2014, the number of farmer decreased becomes 528,506 persons. The decreased by 61.663 persons (decreased by 10.45%) compared to earlier year. This condition indicates that the support of Bali culture was also drastically decreased.
The development of Bali Economic that is based on tourism, also push the migrants move to Bali. In 2010 (population census) indicated that the migrant who stay in Bali was 61,209/year in average. There is significant correlation between the growth of tourism sector and number of migrants. Those migrants will need housing area, job, etc. Because of the income from rice fields are very low, so the farmers very interested to build house on their rice fields, and then invite the migrants to rent their house. In other hand the land tax in Bali is very high, high water competition, water pollutions, etc, are the other conditions, how the agricultural sector is always marginalized. So, the Bali culture and subak will marginalized also.

CLOSING REMARKS

Farmers and subak in Bali very respect to the existence of water, and rice culture at the rice fields. They offer ceremonies for respecting them. These activities support the Bali culture life. Subak has been established since 10 centuries ago, and have been recognized by UNESCO as the world cultural heritage since 2012. But nowadays, the subak in Bali faces extra-ordinary challenges, because of the tourism development. The rice field has been converted, until 750 ha-1000 ha/year. Meantime, the land tax is very hard to pay by the farmers, high water competition, and water pollution become other challenges by farmers. If there is no strategic program made by the government, the agricultural sector will finish, and also the subak system and Bali culture will be destroyed.

BIBLIOGRAPHY


