CONCLUSION OF THE 2002 TASAE

OVERVIEW

The 2002 Tsukuba Asian Seminar on Agricultural Education (TASAE) was held on 6-12 November 2002 and had participants, country representatives, each of whom delivered their respective country reports. The representatives were Dr. Xinxiao Yu (China), Dr. Hidayat Pawitan (Indonesia), Dr. Soon Hyuk Lee (Korea), Dr. Noel Trustrum (New Zealand), Dr. Danielito T. Franco (Philippines), Dr. Roy C. Sidle (Singapore), Dr. Veerasak Udomchoke (Thailand) and Dr. Hideji Maita (Japan). The theme of the Seminar was "Present situation on the water resources and water related disasters, and the role of agro-environmental education".

PRESENT SITUATION

Present situation on the water resources and water related disasters, and the role of agro-environmental education in participating countries can be summarized as follows:

China

The general situation of Chinese water resource and water related disasters were introduced in the paper. China will have a severe water resource situation until 2050; only 2.7×10^{12} m^3 water is available now every year with increasing serious water pollution. Eco-environment is in deterioration under a great water deficit. Flood, drought, soil erosion and water pollution are dominant water related disasters in China; they have affected our productivity, daily life and the whole eco-environment.

Current situation of agro-environmental education is closely followed. China has 44 middle and high agricultural and forestry schools, with 15 corresponding disciplines. High agro-environmental education mainly exists in soil and water conservation and combating desertification, agricultural resources and environment and horticulture in 53 schools. By 50 years of development, Chinese forestry environmental education accompanied with resource and environment related discipline has formed an omni bearing cultivation system, which benefits Chinese people to manage water resources rationally and improve their ability to combat disasters greatly.

Indonesia

The 2002 flood events in Indonesia occurred all over the country taking death tolls of 155 deaths, 13 missing and some 383,900 people evacuated of their homes as floods damaged more than 3,100 houses and inundated another 94,600 houses. The estimated economic losses of this recent Jakarta flood alone were 5-6.7 trillion Rp (more than half a billion USD), accounting direct material damages and indirect losses as impacts of the flood. These disasters had awakened awareness of the decision makers and legislators in Indonesia of the importance of water resources and water related disasters to the national economy that opened new challenges to natural scientists, especially meteorologists, hydrologists and climatologists, to contribute professionally to the community. Population pressure with intensive agriculture and recent rapid physical development implied extensive land use changes and increased water demand that generated degraded lands and soil erosion, and to cause long-term changes in regional hydrologic regimes in Indonesia. The impacts of floods and droughts are significant; causing crop failures and severe droughts that is associated to El Nino phenomena also induced forest fires and transboundary haze problems that can disrupt air transport. The importance of agro-environmental education is recognized and fulfilled mostly by State Universities with faculties in agro-complex subjects, however in present situation in practice, there is a lack of necessary hydro-climate information from actual observations.

Korea

Korea has a mean annual precipitation of 1,283 mm. that is 30% higher than that of the world's average, 973 mm. However the annual average precipitation per capita is 2,705 m^3, which is mere 10% of the world's average of 26,800 m^3. Due to the topography and climate conditions, Korea's river flow considerably varies throughout the year, which repeatedly causes serious natural disasters such as flood damage, drought, loss of lives and property.

Korea should fully prepare to secure water resources and overcome droughts. For this end, drought measures including construction of small and medium multi-purpose dams and small water exclusive dams and expanded development of multi-regional water system in addition to the development of ground water, ground water dam and combined management of dams within river systems and operation of water resources information system should be established and pursued.

In addition to aforementioned measures, policy and regulations for water saving should be established and various water related information should be easily available in real time through the development of an integrated water resources management system.

New Zealand

On a world scale New Zealand has abundant fresh water, but the degree of spatial and temporal variability of rainfall results in severe climatic and hydrological extremes that cause floods and droughts and erosion and sediment disasters. Although water resources (and related water disasters) are fundamental to New Zealand's social and economic well-being, questions can be raised with regard to their sustainability given the potential for depletion over the longer term. Furthermore, the degree to which formal education focuses on these issues is minimal with few tertiary students studying environmental processes and their impacts. Although general public awareness is fickle and only becomes heightened following extreme storms and droughts, management of water resources and their impacts is embodied in resource management law and is implemented by national and regional organizations with increasing levels of community participation.

Attention is moving towards a more integrated understanding of catchments dynamics and their behavior through time. New research prorgammes integrate land and water environments to assess land- use effects on sediment and carbon fluxes from river basins to oceans, and the potential role they play in addressing global greenhouse gas and climate change issues.

Philippines

Among the various countries of Southeast Asia, the Philippines is the most geographically disadvantaged, climate-wise, being located at the natural trajectory of tropical storms born in the Western Pacific and the South China Sea. Twenty (20) of such storms on the average, affect the Philippines each year. Some in interaction with the monsoons and the intertropical convergence zone, cause extensive damage to agriculture, fisheries and public infrastructure due to floods, stormy winds and landslides.

The country is periodically affected by intense ENSO phenomena every 4 to 5 years, the main consequence of which are prolonged droughts that reduce or destroy crops and fisheries.

These recurring disasters are among the major reasons why Philippine economic growth has lagged behind its ASEAN and Asian neighbors. Money, which could have been invested for long-term development, has to be spent for reconstruction and disaster alleviation. Crop and fishery production failures due to floods and droughts force importation using valuable foreign exchange. This scenario has repeatedly occurred over the last 50 years.

The natural factors causing floods and droughts interact with population driven land-use change as forest to agricultural conversions, agriculture to housing or industrial use

conversions resulting to high soil erosion losses, which in turn reduce land productivity.

Finally there are inadequate facilities and low public investments for baseline hydrometeorologic data generation. There is likewise a lack of political resolve to implement national policy for effective land and water resources conservation and utilization.

Singapore

Much of the potable water in the Southeast Asian region comes from headwaters emanating from forests and agricultural lands. However, many of these forests have, in recent years, been subjected to so many land conversions, from forests to agricultural lands, forest to oil palm plantations and other industrial land uses. Thus, all these changes in land cover significantly affected the quality, quantity and timing of water. It is during these past decades when countless water related disasters have been recorded, disasters which have had great impact on the environment such as severe flooding, landslides, debris flows and severe soil erosion, plus the widespread sedimentation which all posed threat and hazards to humans, infrastructures and property. The severity of natural hazards can increase depending on the environmental activities. And for this matter the Southeast Asian countries, compared to other parts of the world, faces a greater risk due to the fact that many of these countries are trying to cope up with the economic losses. This results to increasing the demands for land uses, which unfortunately only causes environmental stresses. The media keeps on blaming that the cause of these environmental disasters, particularly water-related disasters, is deforestation which is undoubtedly one factor but, it must still be viewed in a much wider scope. The land use changes are driven by so many factors, such as urbanization, industrialization, and enormous demand for timber by a growing population. These changes in land cover all affect the hydrologic processes. While much of the water related disasters in the Southeast Asian region are a combination of so many interactions of environmental and anthropogenic activities, there remain, the need to really understand the dynamics of the water resources and the urgency to consider the sustainability of the water resource. Government policies must address both the economic needs of the people but must also consider the sustainable use of the resources.

Thailand

There are 25 major watersheds in Thailand that drain 209,251.28 MCM. of annual run-off by 1,421.27 mm. mean annual rainfall. The southern watersheds show the highest mean annual specific yield as 28.52 liter/sec/km^2 due to the higher rainfall amount. The ground water recharge of overall area is 38,000 MCM, which are about 17% of the annual run-off and about 0.48% of the mean annual rainfall amount. The spatial and time distribution of

climate resources were analyzed and mapped. Four major climatic regions were classified for the rainfall amount, evaporation, annual mean temperature and topography. They were the Equatorial Climate, the Tropical Monsoon Climate with long rainy season, and the Tropical Monsoon Climate with long dry season. The frequency and duration analysis of the influential factors on the climate in all seasons were carried out. Five seasons distinguished as the Northeast Monsoon Season (NM) during January, February, November and December; Summer Intermonsoonal Season (SIM) during March and April. Onset Southwest Monsoon Season (OSM) during May and June, Southwest Monsoon Season (SW) during July, August and September; and Winter Intermonsoonal Season (WIM) during October. The climatic regions and climatic seasons intently related with the climatic influences that comprise 9 components. The hydrometeorological disaster in Thailand comprises flooding, windstorm and drought. Tropical storms accompanied by the Active Southwest Monsoon and the Active Intertropical Convergence Zone. They play the major role on windstorm and flooding disaster. The long-term stationary situation of Tropical Convergence Zone over Southern China and Northern Thailand cause severe drought in the wet period of Central and Southern Thailand as well as very wet condition in North and Northeast. Whenever the Active Intertropical Convergence Zone moves down to Central and the Southern Thailand, heavy rains will occur and flooding and landslides will follow. Drought in the dry period always depends on the effect of El Nino and Southern Oscillation (ENSO). The very strong activity of ENSO will cause the severe drought for a long dry period.

The role of governmental strategy on the agro-environmental education is concluded into two main ideas. The people's participation activity, which is the new hope that would lead to natural conservation and watershed development using at most care for the benefits of the next generation. The curriculum for the environmental and land care basement activities is the earth science studies of the primary level (1-6) and the secondary level (6-12) for the understanding on the relationship and the interaction of geological resources, water resources and atmospheric resources. As one of the strategies, the new generation will join hands to put into practice the concept of people's participation in taking care of their own land, forest, watershed and atmosphere for better life and less natural disaster in the future.

Japan

Recent water demands in Japan have remained stable, or at least have not increased since the 1990's. At the same time, public awareness of the environment has forced water managers and planners to rethink traditional approaches to water management in favor of new ones that are necessary to respond to concerns about a return to a more natural hydrologic regime to restore ecological and geomorphic functions to rivers. As a result, expectations of

forest functions such as soil and water conservation and environmental protection have grown. In fact, forest treatment has the potential to control the amount and timing of stream flow by modifying the distribution and amount of evapotranspiration losses. Appropriate forest and water management practices are useful methods to support new approaches to water management that are in harmony with the environment. Although forest hydrologic research has made considerable progress, few researches have been validated over a wide range of conditions. We must conduct more research into developing forest and watershed management techniques to maintain or improve water resources and put appropriate forest and watershed management for water resources into practice.

KEY ISSUES

Global climate change issues

1. Trends in changing climate regime, especially climate extremes, are likely to be impacting on landscapes ecosystems in different regions
2. Inter-annual and decadal distribution of rainfall as influenced by ENSO activity

Natural versus anthropogenic influences

3. Need to discriminate between what is 'natural' and what is human induced and should be mitigated against
4. Geographical location predisposes countries to high "natural" rates of runoff and soil erosion (including landslides), floods and droughts
5. Population pressures on land and water resource utilization

Land use and cover change issues

6. Remaining land conversions are likely to be in "sensitive" headwater areas, where land use is converted for short-term economic gain
7. Land tenure issue and the conflicting interests of different land owners
8. Lack of political motivation to implement policies and sustainable land use
9. Impacts from infrastructure development in some regions are yet to be realized
10. Conservation and stewardship of land and water resources is lacking in all countries regardless of socio-economic status
11. Widespread land conversion practices (including land and forest fire) such as conversion to industrial forest plantation, oil palm and coffee may significantly affect runoff and erosion

Water supply and demand issues

12. Rural water demands will be mainly agricultural and only for minor domestic use
13. Urban water demands and pollution are increasing due to “mega-city” development
14. Long-term depletion of water storage capacity of soils due to erosion alters hydrological regime and tends to intensify floods and droughts.
15. Eco-environmental water demand should be considered such as sustainable river flow etc.

Public education and awareness

16. Increased agro-environmental education at schools and the general public
17. Lack of knowledge of the people about the complex interactions of water, sediments, nutrients and land use (vegetation - cumulative watershed effects have given rise to ecosystem degradation and unnecessary water related disasters)
18. Lack of government investment in research and monitoring of water related resources and disasters
19. Need for economic valuation of ecosystem services provided by land and water resources and associated costs of their depletion

RECOMMENDATIONS

Global climate change issues

1. Consideration of the effects of predicted climate extremes (due to global warming and ENSO) should be incorporated in future land management/practice options.
2. Improve predicted capability using combination of global climate models, long-term monitoring records and where possible reconstructing paleo climate records (i.e. tree rings, lake sediments, pollens etc.). To obtain high resolution paleo climatic records where possible link to global research programmes such as IGBP.

Natural versus anthropogenic influences

3. There is a need to discriminate between natural and human induced effects so that counter measures can be targeted where they will have the greatest benefits for sustainability.

Land use and cover change issues

4. Appropriate regional and national policy/legislation should be formulated/enacted to

regulate accelerated forest to agriculture, and agriculture to other land use conversions, currently prevailing in countries in Asia.

5. Use participatory processes to implement best management practices during land use conversions

Water supply and demand issues

6. There is a need to incorporate water conservation and recycling in planning for the long- term supply of water services to meet the increasing future water demand.

Public education and awareness

7. Use participatory processes to educate people about the complex interactions of water, sediments, nutrients and land use (cumulative watershed effects) when considering resource allocation and application of mitigation practices.
8. There is a need for public investment for research and monitoring of water related resources and disasters and the government should provide the necessary budget for this.

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