GUEST EDITORIAL

Cultural diversity and biodiversity as foundation of sustainable development

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INTRODUCTION

We know that there is only one earth, there are many different worlds. Different worldviews do not only have significant political and socio-economic repercussions but they also determine the way in which people perceive and interact with nature, thus forming their specific culture. Natural ecosystems cannot be understood, conserved and managed without recognizing the human culture that shape them, since biological and cultural diversities are mutually reinforcing and interdependent. Together, cultural diversity and biological diversity hold the key to ensuring resilience in both social and ecological systems (Erdelen, 2003). Through the environmental sciences and cultural activities, in promoting awareness and understanding of the relationships between biological and cultural diversity as a key basis for sustainable development.

Beside has high biological diversity Indonesia also possesses high cultural diversity. It doesn't marvel that Indonesia is the world's largest archipelago, containing more than seventeen thousand island extending in an east-west direction for five thousand two hundred kilometers across the Sunda and Sahul continent shelves. The archipelago exhibits rich biodiversity that is unequalled in Asia (McNelly et al., 1990). Indonesia's territory cover 7.7 million square kilometer, of which approximately 5.8 million square kilometers (75.3 %) is comprised of marine and coastal waters. Indonesia is located between two of Earth's biogeographic regions: Indo-Malaya and Oceania. The Indo-Malaya region to the west includes Sumatra, Kalimantan, Java, and Bali, and the Oceanic region to the east includes Sulawesi, Moluccas, the eastern Sunda Islands, and West Papua.

The vegetation types to the east and the west of the Wallace line are divided by a biogeographical boundary that extends from north to south along the Sunda Shelf. The natural vegetation on the shelf it self is comprised principally of the Malesian type, dominated by the commercially important Dipterocarpaceae. Vegetation to the east has greater affinities with Oceanic Austro-Pacific zone and is dominated by mixed tropical hardwood species. Deciduous monsoon forest occurs in seasonally dry areas, particularly in the southern and eastern islands such as the Lesser Sunda and the southern part of Papua. The outer islands of Sumatra, Kalimantan, Sulawesi, Moluccas, and Papua comprise approximately 10 % of the world's tropical rainforest. Indonesia has more tropical forest than any other single Africa or Asia country, and is second only to Brazil in terms of tropical forest area. This country characterized by an enormously varied topography of shallow coastal water, swamp, lakes, alluvial plains, volcanoes, and High Mountain ranges. This country also presents at least forty-seven distinct natural and man-made ecosystems. These ecosystem types ranges from the ice mountain ecosystem and alpine grassland on the high mountains in Papua (Puncak Jaya Wijaya, at an altitude of over five thousand metres0 to variations of tropical rainforest ecosystems – from lowland to mountain landscape, shallow swamp to deep lakes, from mangroves to algae communities and coral reefs – as well as an ocean ecosystem reaching as deep as eight thousand meters below sea level (MoF/FAO, 1991).

Unfortunately, little respect has been given to the high diversity of the archipelago, resulting in disappearance of many of these cultures. Studies to

document and learn traditional wisdom are needed urgently, not least because traditional knowledge is often compatible with sustainable development objectives, as discussed in the World Summit on Sustainable Development, in Rio de Janeiro, 1992 and in Johannesburg in 2002. Meanwhile the deforestation in Indonesia occurs at an alarming rate. Forest cover decreased from about 193.7 million hectares in 1950s (Hannibal, 1950) to 119.7 million hectares in 1985 and to 100 million hectares in 1997 (GOI/World Bank, 2000) and only 98 million hectares remain (FWI/GWF, 2001).

The local knowledge of environment management and indigenous custom, as part of indigenous culture, is the product of long interaction between man and their environment and also results of their ability for application the technique adaptation to their environment. High biological diversity has utilized for economic reason, even though this national asset has not yet been fully developed.

Dynamic interaction between people and biodiversity in Indonesia let to the creation of many different cultures and thus languages and dialects. More than four hundred Indonesian ethnic groups are dispersed in different regions. Indonesia boasts 665 different languages and dialects, with Papua accounting for 250 of these, Moluccas 133, Sulawesi 105, Kalimantan 77, Nusa Tenggara (Lesser Sunda Islands) 53, Sumatra 38, Java and Bali 9 (Grimes, 1988). Such ethnics have specific knowledge about how to manage their environment and biodiversity surrounding them. Every ethnic has a specific culture, knowledge and local wisdom and technique adaptation to their various environments.

Concerning the cultural richness in Indonesian, besides have advantages also constitute weaknesses for biodiversity resource management. One of these advantages is that we have various referable traditional pattern and alternative selection of space management and we have material to design system admissible management by all societies and also government. Meanwhile its weakness is that each ethnic has specific pattern according to environmental condition and cultural level. But along with time developing marks sense decentralization of policy in Indonesian, therefore local or region policy that based on actual condition area and society is more elegant compared with uniformity management which hasn't obviously fastened by other area that has different culture and environmental condition.

CONCEPT OF NATURAL RESOURCES MANAGEMENT "LOCAL AND GOVERNMENT"

Basic concept of biodiversity resources management

Biodiversity concept consists of three principal dimensions (ecology, economic, and ethic), which are not exclusive but complementary. Every dimension has a different argumentation, which have to be developed before convinced by politic and public, which are necessary to conserve the biodiversity that threaten by human activities. The objective of this approach is likely to promote *in-situ* conservation in the sustainable development context. The ethic dimension consists of philosophic and religious aspects. They have a principle notice in which the biodiversity is a heritage of humanity, so that it has to be protected. For the scientific point of views, it has questions for years concerning the original of life form diversity, what kind of this diversity role in the ecosystem function, and what ecological consequence of the diversity reduction. The ecological dimension preoccupied their capacity in the biological system to find a comparable condition in their initial situation after perturbation or anthropisation. Ecologist called this condition as resilience. For the economical dimension, which relates to the biological diversity exploitation, we count the financial term on the actual use and potential of biodiversity. Without Manichaeism excessive, we can consider that the three dimensions also have different enter point which depends on interlocutors for scientific reason, and ecological dimension is a priority. For the economic dimension, the priority is a politic, and for NGO is related with ethic dimension.

Genetic resources have a crucial role in economic development and they must be conserved for present and future generations. Genetic resources-genetic material of actual or potential value performs many important functions as a genetic base for breeding programs, economic assets for future use, and part of the ecological attributes. Realizing the economic importance of genetic resources, there has been a growing concern among the developing world in conserving these resources through *in-situ* and *ex-situ* approach (Zakri, 1993). It means that some genetic

resources may be best conserved by growing them in nature reserves or genetic conservation areas and a few may be best kept as collections in stored seeds or advanced cultivars.

The biodiversity is a heritage of evolution that is constructed in the climatic and geomorphologic context in perpetual changes, vaporized also by speciation. In fact, distribution of biological diversity is a result of environment history, the climatic condition, and the ecologic distribution, which prevails locally. This heritage is threat by anthrophic activities, and may also by direct menace of the global changes.

However if these significant regions of the world in terms of biogeography and biodiversity are not managed wisely then these are undergoing rapid destruction. Many species of ecological and economic significance are liable to go extinct before their systematic and biology is studied scientifically. Potential sources of plants are likely to be lost forever. This happened to many remote areas in Indonesia where the unique and diverse plants suffer from the increasing land use and human impact.

Biodiversity resources management

In general, the problems of biodiversity resources management are: (1) *degradation of natural resources richness*; (2) *management aspects:* given biodiversity resources management rights to particular stake holder has evoked unfairness which caused conflict and social resentment; (3) *social-economic aspects:* natural resources exploitations have raised income for particular people consequently created social, economic, and cultural problem in local society around the exploitation area; (4) *socio-cultural aspects:* the proclivity differences in utilizing biodiversity resources have evoked socio-cultural problem and conflict; (5) *law aspect:* continuous conflict of biodiversity resources employed indicated a problem of law enforcement; (6) *environmental aspects:* environmental quality decrease because of erroneous exploitation of biodiversity resources; and (7) *knowledge aspects:* up to now we don't have enough information regarding our biodiversity richness, further more research on biodiversity research study kept scattered in many institutions.

It is so unfortunate that conservation area declared and stroke by goverment has been destroyed and log illegally. There are many conservation areas such as nature preservation, nature protection and national park is not succeeding as they intended because their applied conservation concept is a western-based concept. This concept style doesn't compatible with local culture. However many traditional protection area around the world have more respected and sustained. This is because managing protected area in traditional way has defense constant degradation of environment combined with local believe and culture.

In general regarding the biodiversity conservation area, the management and policy maker ignored local cultural concept because it has complex devotion. It has to be changed because we realize that human are part of life-included biodiversity, so it has to manage as one ecosystem. In the end the stability between functional and ecological aspect can be achieved.

The ethnoecology study has been done by LIPI in some Indonesian ethnics showed that people tradition can do management activity of natural resources, if they have access and control on their resources included tradition and common law that declared by their community as well as another community. The problem is two land tenure system in Indonesian applied: land tenure based state system and land tenure based community system where mutually discard if these two systems applied. In practice, if this two-land tenure system was employed, it will evoke conflict between societies and the government (conservation area management). Indeed this conflict won by government based on UU No. 5/1967 and UU no. 41/1999 which stated that forest custom ownership is part of forest State ownership. If this system regularly applied will create continues conflict on biodiversity resources management. Therefore in order to decrease the conflict, the management has to revitalize cultural value using indigenous knowledge adding with more scientific concepts.

The concept of conservation area management has been developed. Unfortunately to some extent still diminish local people involvement; even only give a kind of authorization on traditional management practices of natural resources detained by local people. Even the management conservation area priority program has changed in large scale conservation, accounted from how large area to be managed and also financial supported. But these strategies apparently more accentuate scholarships scientific support instead of weigh social reality of a

conservation area as management object. There is inclination not to include indigenous people because they seemingly difficult to collaborate under modern conservation strategy. According to Chapin (2004) *cited by* Rovihandono (2007) this condition has evoked conflict such as civil disruption or even violence. The impact of intervention management of conservation area for local people is decreasing local value and wisdom from generation to generations and influenced sustainability of natural resources management and in the end will eliminate the local culture itself.

In Indonesia, effort of conservation area management involving local people participation has been done through collaborative initiative program (co-management) by socio-economic development society, even the result far beyond expectation of increasing local people prosperity. For example ICDP approach (*Integrated Conservation Development Projects*) and IPAS (*Integrated Protected Areas*) that involving local people participation (co-management) at Bunaken National Park, North Sulawesi. Ineffectiveness implementation of this program is according Barber et al. (1997) *cit* by Rovihandono (2007) caused by ICDP activity doesn't lead to conservation principles and method failed because of incentive system is not enough to change society behavior in biodiversity resources exploitation.

From the policy aspect, government has tried to combine local concept and government concept of conservation by SK Menhut no. 783/Kpts II./1992 that arrange forest managements as Nature Reserve. Government, NGO and also local society hold the management. However in practice the impact of this management still dissatisfactory because government concept more overriding than local concept.

PRINCIPLES OF BIODIVERSITY MANAGEMENT AND SUSTAINABLE DEVELOPMENT

In recent decade, culture as well as sustainable use of biodiversity knowledge by local people has been developed. One series of biodiversity conservation action was established in Earths Summit in 1992 that highlighted three relevant development that environmentally sound, which is (1) all countries have role in reforestation and biodiversity conservation; (2) biodiversity have to be managed to meet the need of social, economy, ecology, cultural and spiritual of the actual generation and the future generation; and (3) biodiversity management policy have to support the cultures and rights of local people and societies surrounding the forests. Local society knowledge about biodiversity conservation and sustainable use has to be respected and included in forestry development program (biodiversity).

Concerning sustainable development: The question concerning an operational definition of sustainability has been raised on several occasions prompting repeated declarations to the effect that the wording provided by the WCED (The World Commission on Environment and Development), *"our common future"*, is appropriate. The sustainable define as "development that meets the needs of the present without comprising the ability of future generation to meet their own needs". By itself, the latter statement is unbounded and involves an appeal to *"inter-generational equity"* with the unbounded and involves an appeal to *"inter-generational equity"* with the consequent implicit assumption that the future will somehow be able to take care itself through increasingly effective and efficient technological adjustments regardless of the quality of available resource base (Harger, 1992). Sustainability development of biodiversity are constitute biodiversity's management form that have character result sustainable is showed by its indemnity bond productions functions, ecology and social-economy-culture of biodiversity for local societies. In principle that sustainable development of biodiversity means is biodiversity management that economically productive, social's ala fair, ecologically sustainable, politically participative, and and dynamic in cultural (dynamic culturally). Therefore each step of biodiversity's management shall get to render biodiversity's function balance as resource development and sustainable life system and efficient used to supporting sustainable development.

Sustainability implies: (1) improved economic well-being without jeopardizing future needs; (2) appropriate use resources without obvious degradation setting in; (3) resources use in a manner that would contribute to equity and social justice and avoid serious disruptions; and (4) appropriate use of resources in a manner that optimizes maintenance of cultural and biological diversity (Ramakrishnan, 2001 *cited by* Harger, 1992).

Major factors affecting "sustainability": one of the most difficult areas to deal with will be assessment

of the effects of natural resources exploitations. On the one hand, natural resources exploitation enrichment to human social systems is clearly used to promote increases in carrying capacity and the elaboration of counter-entropy structures. On the other, the act of natural resources exploitation and subsequent natural resources degradation promotes vast and as yet un-quantified negative environmental impacts and instabilities. Urgent work is required to assess the possible effects of increasing natural resources exploitation on global, regional and local systems, and to find the new solution natural resources management that sustainable.

CULTURAL DIVERSITY IN INDONESIA: LOCAL KNOWLEDGE IN NATURAL RESOURCE MANAGEMENT

Protection of area with reason to protect natural resources which have a vital benefit to society is with application of custom order, for example custom order execution for the protection of forest which is there are sources of wellspring, *sasi* execution to protect the type of resources involve like some marine product type like sea-cucumber, *batulaga* (kind of cockle), and other which have high economic value in order diminish abundant exploitation (Purwanto and Laumonier, 2004). This situation can be found as well in Bunaq society in East Nusa Tenggara, protecting sacred place spread over in the area with custom order. The reason of this protection is because of this sacred area has water resources and high plant diversity compared with other area (see Purwanto and Soedjito, 2004 and Friedberg et al., 2004). While example from Dayak society is determination of sacred forest and *tanah ulen*, especially by Dayak Kenyah society. Specially *tanah ulen*, although management system of this area is predominated by noble and have the exclusive character, but from exploiting aspect and conservation gave an advantage for society in general (*see* Purwanto and Soedjito, 2003).

Every ethnic or society group in Indonesia have planology concept which determine a planology unit as sacred area. Every sacred area has unique specification in every society and region. We need a "setting" and special criteria to identify and classify the sacred area applied and implemented, so that cultural conservation and natural resources can be accepted by society. Based on the perception in some society group like Baduy society in Banten, Tanimbar society in South-East West Moluccas, Kei society in South-East Moluccas, Bunaq society in NTT, Dani society in Baliem valley, Anak Dalam society in Jambi, Toro society in Middle Sulawesi and others indicate that protection area by custom or by sacred or by applying custom order can take care of environment further compared with formal regulation. Traditional society still esteems custom which becoming agreement and respects it. Magical dubious influence in character more adhered than a punishment in term of physical. Societies still tend to adhere custom rules, which made by the agreement than the formal regulation, which made by government.

For example Baduy society has been able to conduct the continuation of natural resources involve in its area based on zones system, which in harmony with modern management of zones system a biosphere pledge. Division of Baduy area zones system the core important relied on the sacred level and social function of Baduy society culture and economics. There are 3 zones: (1) nature patrimony forest zone or *arca domas* and *sasaka domas* sacred forest, this area is equal to zone central; (2) zone which is analogy with prop area that is outside sacred forest area dwelt by internal Baduy society (Tangtu); (3) area which the analogy is equal to transition area that is area outside Baduy is dwelt by external Baduy society (penamping/dangka area). Besides that, every hill, which is in prop and transition area, is also managed with sub-zones system. Through this traditional planology concept, in general Baduy society can manage natural resources self-supporting and have continuation (Iskandar, 2007).

This situation above also happened at Toro society in Lore Lindu National Park, Central Sulawesi. This Society can revitalize their relation with forest area around them. The Toro's has developed real effort which addressed problems met in their interaction with forest resources, namely Lore Lindu National Park. In these cases, Toro has revitalized the institution concerning the natural resources management. The institution revitalization is one of the Toro's adaptive strategies to response the environment changes (market intervention and public influences). As a whole the Toro institution prove its adequate ability managing and utilizing forest resources sustainable (Golar, 2007).

ADVANTAGE OF LOCAL KNOWLEDGE IN TRADITIONAL CONSERVATION

Management System of natural resources has relied on equality in principle benefit and reciprocal (reciprocity) to balance social compatibility with its environment. Conservation variety concept involves in Indonesia more knowledgeable based on concept from western. Indonesian conservation conception was applied first time in Arca Domas area in West Java by Netherlands in the year of 1921 as Nature Reserve. However actually, the Arca Domas area previously conserved by local people with their on way to sacred it. Similar matter happened in the entire region either in Java, Bali, NTT, NTB, Sumatra, Kalimantan, Sulawesi, Maluku, Irian Jaya and other regional where each region have their own distinctiveness. We analyze Indonesian traditional conservation concept more excellence, reasonable to be justified regarding conservation point of view and have more sustainable use. Furthermore the area itself has been managed reasonably so can give more valuable result to local people. An example of this can be seen in *Tanah Ulen* area by Dayak Kenyah society in East Kalimantan or applying of sign or *sasi* of prohibition order arranging natural resources exploiting in Maluku society, determination sacred area to protect natural resources and much more.

Based on local knowledge study of conservation concept in areas which is sacred or to be sacred, they actually have system when we look from the ecology aspect have high conservation value. In daily life local conservation system society related to religion and local trust is more respected than formal conservation system. As a religion society like Indonesian in general, they very respect to things, which in religion character, have a high place in their life. So it is not surprising if sacred places still stay conserved than other places, which is not sacred.

The area is becoming sacred or conserved locally because society as a whole has responsibility taking care of it and they share sense of belonging as well. Beside that, there is believe that collision to the area will get custom punishment or social punishment which psychologically will embarrassed him and his clan, so it is very obviated to brake the custom norm which have been agreed. This means social punishment is heavier than physical punishment by paying other physical penalty.

Cultural conservation based concept is very effective in its society. Unfortunately, this good concept doesn't get any acknowledgment and attention from the government so eroded by unbeneficial changes.

Some advantages of management conservation area based on local culture as follows:

1. *Conservation traditional area (sacred natural site) have great value for ecology conservation :* as area of high biology diversity, as sanctuaries for rare or threatened species and endemic, as sites that protect freshwater sources, areas and still prestine, as indicator sites showing potential natural vegetation in areas subject to environment degradation (important for restoration and rehabilitation of degraded ecosystem), as a natural representation of ecosystem and landscape of this areas, and gene pool of biodiversity.
2. *Having more everlasting conservation dimension/long-range (sustainable)* → Local society has protected the natural sacred area long time ago. When the natural sacred area on guard on a long term, the biological process of resources in this area more complete, so that can be made as "public awareness demonstration" area of environmental education in order to manage the system of natural resources conservation effort and continuation.
3. *Natural sacred area can be used as management sacred area model;* it has more holistic character especially related aspect between human being and natural resources as integrated form between natural value and culture in system management of resources. Beside that this sacred area also used as environmental management strategy or participative model through conceptual and also practical. In principle the management practice is togetherness or has a share to take care of area because all society experiences the benefit. As good as any model will not succeed if the model is not gave an advantage and accepted by society. So that in this context we earn to learn from formulation "buffer zone management" around sacred area. So that there are possibilities to integrate between conservation areas with local society and can improve advantage and repair society behavior as well as concerning conservation area regulation.

4 *Protection and taking care of traditional knowledge* → sacred area conservation saving effort represent cultural society and local knowledge conservation.

5 *Cultural Manifestation and cultural diversity* → local Conservation area or sacred areas have cultural value as well as a reference from culture, religion, and identity of society group and even identity of nation.

6 *Eco-tourism* → sacred areas represent the part of cultural properties and natural resources (heritage cultural and natural) from society group which have their own specification and can be made as eco-tourism object. But, it is need a special treatment in order not happened on the contrary.

7 *Sacred values* → Sacred area have religion value which have to be esteem, to be respected and protected as elementary manifestation from traditional trust, specific philosophy value and spiritual from local culture.

Although traditional conservation areas have some roles, advantages and function, but these areas have also menace and weakness to its occurrence such as:

1 *No confession:* from government in general and even there is a massif pressure about this area and still continue recently.

2 *The secret of sacred:* Traditional knowledge secret by custom society become one of the insufficiency or weakness from this area to be able to recognized and comprehended by other society.

3 *Choosing area which is "arbitrary:* From perspective of natural resources conservation and environment, election of sacred area has the character of "arbitrary" and not follow the systematic procedures in determining resource conservation area involve.

4 *Traditional conservation area or sacred area sometimes in the form of artificial ecosystem.*

5 *Cultural change:* As we know with human being culture have the character of dynamic influenced by education, technology, modernization, other cultural intervention which caused extinction of traditional conservation area. Traditional conservation area can give positive influence to natural conservation as long as the supporter community still makes the system of trust as an action reference. When trust aspect become a sacred bases fade or lose, the continuity of natural resources will immediately face threat if there is no cultural mechanism and other institute replace. This matter happened in Toro society and they can revitalize the institute of management area.

6 *Economic advantages:* Resource management is more oriented on economics that can cause decreasing the importance value of traditional conservation area.

7 *Traditional knowledge about ecology:* When traditional knowledge of ecology is applied in traditional conservation area, the traditional knowledge analysis and study about ecology only looked at the erudition aspect based on western knowledge point of view. Thus can cause spiritual assess become loss.

CONCLUSION

To support these efforts, a few challenges must be considered such as:

1 Management of biodiversity which giving room to local culture: In management of biodiversity resources we need to develop new paradigm by opening and giving opportunity to local society to role in every area. This is important to answer a friction of development paradigm from centralistic to decentralist. The modern combination idea based on science (western based) with local wisdom and knowledge based on society (wisdom community wisdom based) representing one way and need to be developed in Indonesia. Early step, need to be done through, is to study local knowledge about management the natural resources scientifically to prove its erudition. Hence if the local knowledge and management of natural resources concept is applied as modern concept. Excellency of applying local concept is that the concept have been comprehended and run by society during old times and become tradition. Besides local culture is to represent cultural expression and culture of society.

2 *Conservation program and sustainable use:* have always to see economic and cultural social aspect from society around conservation area. So that developed conservation program doesn't eliminate local culture and even this collaboration can give the advantage of both sides that is area remain conserve without loss or sacrifice tradition of using forest product.

3 *Need revitalize the cultural value* that is by boosting and utilizing existing local order and at the same time give meaning, which is contextual nowadays. This effort requires combination by introducing scientific way so the decision or agreement made can be justified scientifically and in the positive law if collision happened. To prompt the revitalize process needs effort to identify traditional mechanism in making decision at local institution. Assigning value and showing benefit and the role of conservation can get confession easily.

4 *Need confession to the local concept, which have been conducted by scientific study and apply it in management of local area.* Erudite of local knowledge with aim to rationalize local knowledge, so that we will get the way of newly conservation. Confession of the local concept at the same time-share local culture preservation way in managing natural resources and its environment.

5 Applying cultural based local concept represent one of new alternatives as management resources model and involving everlasting concept and sustainable use.

6 Every management step of biodiversity has to realize the balancing of biodiversity function (economic, cultural social and ecology) as development resources and life system prop everlastingly and utilize efficiently to support on going development concern. In order to strengthen sustainable use of biodiversity resources such steps to protect and maintain economic function, cultural social and ecology (ethic) of biodiversity is needed.

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