

Summary by Kelvin Peh

Title: The changing balance sheet of nature: findings from the Millennium Ecosystem Assessment (MA)

Speaker: Dr. Wolfgang Cramer

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MA is the largest assessment of the natural ecosystems. However, this seminar only provided the essence of the MA with selective statements. Dr. Wolfgang Cramer discussed the conceptual framework and main findings of MA.

Changing in earth system due to climate and land use change is a concern in respect to life. In a changing environment, ecosystems can maintain some of their functions through autonomous adaptations. But these adaptations may not be sufficient to sustaining the ecosystem services needed by human-being. It is important to know the rate of adaptation process of nature. Also, we need to know the dynamic of the systems. Therefore, we must identify the mechanisms that constrain the ecosystem functioning from the perspective of the ecosystem under investigated.

MA gives the structure of these challenges. We need the fundamental knowledge of the biosphere for mathematical models which in turn describe the forcing factor of ecosystem dynamics, such as atmospheric carbon dioxide concentration, nitrogen disposition and land management. MA is the result of many experts' opinions and has undergone extensive review process. It was being called by the United Nation Secretary General in 2000 and was authorized by governments through four conventions, namely: biodiversity, climate, desertification and wetlands.

MA defines ecosystem services (ESS) as the benefits society derives from ecosystem. The evaluation of the consequences of ecosystem change for human well-being was based on the factors which are considered as constituents of well being such as security, basic material, health and good social relations. One finding of MA is that the increases in ESS have brought substantial gain in human well-being. However, the gains were achieved at a growing cost that could diminish the benefits that future generations will obtain from the ecosystems.

The cost of increasing use of ESS has resulted unprecedented change in ecosystems, significant irreversible changes to species diversity, and degradation of ESS. An objective of MA is to assess the magnitude and direction of changes in ecosystem services up to 2050. The MA global scenario analysis consisted of four scenarios: global orchestration (globalized, reactive approach), order from strength (regionalized, reactive approach), techno garden (globalized, proactive approach) and adapting mosaic (regionalized, proactive approach). These scenarios are plausible future, which depict the four basic trends of human society may develop. All scenarios contained both qualitative and quantitative elements but they should not be used as predictions for the future. MA is

not at the stage of translating the findings into global plausibility. However, MA does still provide some insightful applications. For example, under three of the four scenarios, child malnutrition will be decreased by 2050. Also, all scenarios showed an increase in the gains from ESS in term of freshwater provision and food production. Nevertheless, the likelihood of non-linear changes (e.g., accelerating, abrupt and potentially irreversible changes) will also increase. The factors that cause the non-linearity are the loss of species and genetic diversity, and the growing pressure from anthropogenic drivers (e.g., overharvesting of natural resources). These factors will have important consequences for human well-being.