The Asia-Pacific Biodiversity Observation Network presentation began with an opening address by Mr. Kazuaki Hoshino, advisor to Minister of the Environment, Japan. He gave a brief explanation about his history at the Ministry, explaining how he became advisor to the Minister. He also expressed his gratitude to the government of the Republic of Korea for hosting COP12 and the opportunity to host a side event, as well as for sponsoring the six AP-BON workshops at the National Institution for Biological Research at Incheon. He also expressed his gratitude to Dr. Kim, Dr. Vergara, and Prof. Yahara; among others involved in activities of BON.

Recently, the management of biodiversity had become extremely important for policy in conservation. AP-BON has contributed by providing policymakers with relevant data. They also contributed to global biodiversity conservation by provision of data to global networks, as well as collaboration with other regional networks. Furthermore, they were expected to contribute to IPBES for more policy efforts. It was a great honor for the Government of Japan to contribute to global diversity through their support of AP-BON. He concluded by hoping the session would lead to fruitful discussion and promotion of their initiatives.

Next, Mr. Tetsukazu Yahara gave a presentation on the development of AP-BON, Japan. First, he briefly introduced the outline of the conference and subsequent speakers. He discussed the AP-BON network, which was organized under the global network GEO BON. It aimed at developing global earth observation system of systems, which was involved in analyzing nine areas, including disasters, health, energy, weather, and water. Under the core of GEO BON, AP-BON was organized in 2008. In the GEOSS-AP symposium, they regularly discussed biodiversity issues, and were able to build up a network in the Asia-Pacific region for mutual support.

He introduced two publications of their work in the Asia-Pacific region: The Biodiversity Observation Network in the Asia-Pacific Region, 2012; and Integrative Observations and Assessments of Asian Biodiversity, 2014. They summarized how they were able to develop a database and data sharing, and their network of programs, and national BONs and institutes. At present there were K-BON in Korea, J-BON in Japan, Nepal BON, Sino BON, along with many other hub institutes in the Asia-Pacific region.

They were currently constructing the CBD GBO4, and had launched IPBES for regional assessments, which were to be made from 2014-2016. They would soon begin to draft chapter papers for regional assessments. AP-BON activity had many chances to contribute to not only GEO BON, but also compliance to Aichi Targets and contributions to IPBES. In the session, they would discuss how to

contribute further to global diversity through coordination with regional BONs, leading up to the third AP-BON publication. With that, Mr. Yahara concluded his presentation.

Next, Mr. Henrique Pereira spoke about integrating regional networks in GEO BON. He began by expressing his gratitude for the invitation to discuss how AP-BON is involved in the greater GEO BON network, and news on the progress with the essential biodiversity variable frameworks.

Biodiversity change was an immensely complex issue. It could measure extinctions, loss of biodiversity, shifts in abundance, and more. Biodiversity was also under the pressure of multiple drivers, such as habitat change, pollution and climate change. To fully understand biodiversity required knowledge of these factors. We had to understand what the dimension of the biodiversity crisis is. He showed projections of the 21st century to demonstrate how severe the crisis was, with some predictions as high as 60% of species on Earth going extinct. It was impossible to know for sure, because there are few monitoring systems for biodiversity that allow for tracking these. One crucial area was to be able to discover the 'tipping points' when a biome cannot be recovered any further, but they did not have enough data to assess those early warning signs. Thus, the need for biodiversity monitoring.

What was the role of GEO BON? They hoped to be a coordinated global network that shares information on biodiversity and provides tools for biodiversity management. The context of GEO BON includes research, assessment, and monitoring. Research and monitoring were mutual fields, and assessment was mostly carried out with policy makers. IPBES was an assessment exercise, which took in data from research to inform policy makers; however, GEO BON was in the monitoring part, which provided data and could inform IPBES assessments. A similar structure exists for climate arenas, with IPCC assessing and GCOS monitoring.

GEO BON was a bottom-up and top-down organization, existing as mainly a global biodiversity network with regional initiatives. They have working groups at the thematic level, separated by terrestrial, freshwater and marine, all separated by level themselves.

Next, he explained some of the challenges ahead of GEO BON to develop better monitoring to meet the 2020 CBD goals. Countries had to monitor progress towards each of the targets, and many were just starting up or revising their biodiversity observation programs. GEO BON found that countries often needed guidance to accomplish this, and so they stepped in to provide assistance and guidelines on how to build up monitoring. They built up the Essential Biodiversity Variables framework, which was a system that described what any biodiversity monitoring system should measure. Some of

the characteristics of the EBVs were that they can detect change, are quantifiable, were repeatable; allow aggregation and disaggregation, biological, and emphasis on states. This is because GEO BON focuses on change, and how change is progressing.

Last year, with a workshop at the European Space Agency, they published a paper in Science with that framework in mind, and established six solid EBVs classes (for a total of 23 EBVs). Those were genetic composition, species populations, species traits, community composition, ecosystem structure and ecosystem functions; along with other potential variables. They all came along with examples, measurability and scalability, temporal sensitivity, and feasibility. EBVs were related to the Aichi Targets because they were based on national and regional paradigms that can then respond to each of the targets. EBVs could contribute to ecosystem services as well, because many of the services could be derived from primary data on the EBV variables. He gave an example of beneficial species trends, where identifying the range of a particular medicinal herb can also inform you on where the service is being provided. If you understand how the variables change, you understand how the services change.

Mr. Pereira briefly ran through some examples of EBVs in action. One was population abundance; you could have a matrix of species by location across different years, which would become the EBV. Another example was birds in North America, showing richness change and abundance change from 1970-2010. Yet another example was the change in the mean abundance of mammals globally from 1970-2010. That model estimated how many species, or how the abundance of species, has changed over time. The goal was to have for all of the EBVs these kinds of data sets that can be used for scientists, policymakers, and anyone interested in biodiversity change.

Currently they were still developing the EBVs. They carried out multiple workshops, submitted multiple papers, and beginning more assessments to that end. Mr. Pereira finished by providing a website link for GEO BON's homepage with more information.

Next, Dr. Park Chanho spoke about the activities/products of K-BON, with his presentation 'Sustainable Biodiversity Observation Network Activity Enabled through the K-BON with Civil Scientist'. K-BON was basically organized into three groups: NIBR and MEV, research including institutions and universities, and civil scientists like para-taxonomists. Next, he described the three working groups of K-BON. The first was about Korean species and ecosystem monitoring, along with long-term monitoring of CBIS (climate-sensitive biological indicator species); the second was prediction analysis and conversation research; and the third was genetics/phylogenetic diversity research. Citizen participation in biodiversity conservation management was one of the key activities

of K-BON; and Dr. Park offered examples of such initiatives in Germany and Japan. Capacity building was carried out through neighborhood biological monitoring, mainly for fieldwork and workshops, to celebrate regional biodiversity and nature.

The main problem was managing all of the information they amassed. Their solution was to develop the K-BON Monitoring Application, which aimed to collect pictures of species with GPS data. Many people could use the application to collect pictures of diverse plants and animals easily, and track their pictures and where they were taken. Dr. Kim demonstrated how to use the application. The K-BON information structure included a main server farm, with inputs coming from their web interface, smartphones and digital cameras, and observations from other diverse sources imported to their server. They use open monitoring in conjunction with a cloud-based CHM network, including the K-BON server, NIBR database, and the K-GEO server. Dr. Park showed an example of the network in action, showing species distribution analysis of *Niolitsea sericea* and *Abies koreana* with input from K-BON members.

Through this data, they were tracking many changes in biodiversity, monitoring adaptations to climate change by insect pests, and monitoring red list and invasive species. With that, Dr. Park concluded his presentation.

Mr. Ma Keping then gave a presentation about activities/products in China, and introduced Sino-BON activities. He thanked the organizer for the chance to introduce biodiversity monitoring and associated activities in China. First, he showed a map of Chinese Forest Biodiversity Monitoring Network (CForBio), showing the distribution of forest dynamics plots in China, giving examples of a rainforest in Xishuangbanna and a subtropical evergreen forest in Gutianshan. Using the Gutianshan plot, they introduced their approach to grid out a forest into 20 m by 20 m quadrets in a plot, in which 169 seed traps and 510 seedling plots are placed. For seed traps, they collected seeds, fruits, and litterfalls once two weeks and seedling plots were measured twice a year. They also used dendrometers to measure more than 2,000 trees for every forest dynamics plot, which was also measured twice a year. Additionally, they also carried out soil mapping. Camera traps included in the plots were also able to capture native birds, mammals with in and around the plot.

A regional FDP system would include a main plot with the size 20-25 hectares, 3-5 associated plots of 1-5 hectares, and more than 20 smaller satellite plots over a larger area such as a province, in order to capture all potential forest types. CForBio also produced stand books, which described the tree species found in the plot and their distribution within the plot. They have published five such stand books, and can boast hundreds of publications in high profile journals. He also provided some

statistics on how many species of tree species and individual trees they have covered. Dr. Ma also described their annual meeting on FDPs with Taiwan colleagues. They were part of a global network namely ForestGEO, with 13 sites in China along with CForBio. He provided further statistics showing the spread of CForBio into Sino-BON (China biodiversity monitoring network), including 10 thematic monitoring networks and a synthetic center, such as a forest canopy biodiversity observation network and a mammal diversity-monitoring network with camera traps. With the introduction of ABCDNet (Asia Biodiversity Conservation and Database Network), Dr. Ma concluded his presentation.

Dr. Sheila G. Vergara shared the knowledge products prepared by the ASEAN Centre for Biodiversity (ACB). She thanked the hosts of AP-BON for making the meeting possible, and the representatives of GEO BON for coming all the way to Asia.

She described ACB's mandates, that include the facilitation and coordination of biodiversity related discussions among the 10 ASEAN member states (AMS); capacity enhancement on policy development, PA management, etc. and providing the framework and facilities for information sharing. Related to ACB's biodiversity information management mandate, they have organized interoperable databases, populated these with data from reliable global resources and contributions from national reports. They are building partnerships to improve the regional capacity for data management, increase data contributions and ensure interoperability.

Having reliable data improves the quality of regional analysis, assures informed policy development, local area management support, and contributes to the identification of topics for research.

ACB maintains the Regional Clearing House for Biodiversity (CHM). This facility provides access to biodiversity data made available by AMS, presents automatic summaries from data provided, and related maps.

To date, this regional CHM provides auto summaries for threatened coelenterates, mollusks and crustaceans in the ASEAN region as a subset of the species databases. Future work will cover other taxa such as insects and plants. Other resources made available through this clearing-house are the e-library, with over 10,000 sources to assist in research; and interactive maps and graphs prepared from available data.

The results of data analyses are incorporated in the ASEAN Biodiversity Outlook, an ACB publication. The data and analyses are likewise used to design animated videos for distribution to elementary schools as part of the toolkit used to teach biodiversity conservation. Available videos are on

threatened species, marine and coastal resources, invasive species and an interpretation of the ASEAN biodiversity outlook. Applications (apps) for smartphones have been designed for ASEAN Heritage Parks, and to make the e-library accessible to a wider audience. These knowledge products have been identified through a structured Knowledge Management Strategy.

These knowledge products are supplemented with media forums and training, use of social media and the Internet, print and audio visual (AV) materials, exhibits, the Champions for Biodiversity initiative, photo contests, and Fun Runs for Biodiversity as part of ACB's Communication and Public Awareness strategy. With that, Dr. Vergara concluded her presentation.

Next, Mr. Ishii Reiichiro presented on the activities/products of J-BON. He briefly introduced the organization as a network of researchers, NGOs and policymakers coordinating various research activities, observation networks, and databases on ecosystems and biodiversity in Japan. The organization of J-BON consisted of an executive committee on top, with an organizing committee and secretariat. It had eight working groups, and included interface, remote sensing, assessment and projection, inland water ecosystem, marine ecosystem, forest ecosystem, terrestrial species/genetic diversity, and agricultural land/grasslands/Satoyama. Naturally they collaborated with GBIF. Their mission was coordination of research projects and facilitation of utilization of existing biodiversity data: managing, monitoring, networking of various activities; contributions to policymaking; networking with others to assessing biodiversity. They developed models and tools to assess biodiversity and ecosystem services in AP, with three themes: modeling and mapping biodiversity changes: gene and species diversity changes; and forest, freshwater, and marine ecosystems. They contributed to IPBES, GEO BON, CBD, REDD+, and national strategies.

GBIF Japan, with J-BON, would hold workshops on integrated red list/invasive species analysis in East Asia. They also collaborated with JaLTER, for long-term research, which has 20 core sites and 36 associate sites throughout Japan; and the JapanFlux database. Currently they were making a data paper online, together with the Ecological Society of Japan. Collaboration and publishing data itself has become much easier due to the Internet.

J-BON also worked to network other related agencies, such as with space agencies like JAXA in order to acquire satellite data. Their input to JAXA facilitated solar radiation maps, rainfall maps, landcover maps, forest/non-forest maps, sea ice maps, and forest height maps. These data contents help facilitated biodiversity assessment. For instance, these kinds of activities could be published; their work was published in CDB-72. They have responded since 2014 to SCBD notifications, acting as a platform for scientists' communities in Japan. With that, Mr. Ishii concluded his presentation.

Finally, Mr. Dedy Darnaedi spoke on biodiversity observation activities in Indonesia. He referred to the GEOSS-AP in Indonesia, in which the country participated, to address water and land-related observation issues. Data sharing and access, knowledge transfer, experience exchange, and user requirements for decision making became priority targets for their working groups. He reiterated that Indonesia was one of the biggest countries in Southeast Asia, and was very rich in ecosystem types, species numbers, and endemism. That was exactly why it was crucial to have a database and study the ecosystem diversity in the country. One such data plot he presented the was distribution and profile of vegetation types in Lorentz National Park, West Papua. Another example of their work was a data plot of the species richness in a forest ecosystem in different islands in Indonesia (Java, Sumatra, and Kalimantan), which showed that an increase in size of area showed an increase also in the numbers of species, suggesting a minimum requirement for a representative plot size.

Biodiversity observation activities in Indonesia included those with AP-BON, where they collaborated with Japan to identify particular terrestrial species; and other studies that reaffirmed the decrease of the richness of plant species in accordance with altitude and plot size, in plots around the country. They also contributed to research between LIPI and Seoul Women's University, Republic of Korea, where they gathered a total inventory for all species in 2 cm up in DBH. That research was still ongoing to monitor population dynamic in a long-term period. The data from that research showed a vast distribution of one particular tree fern species *(Cyathea spp.),* but only three specimens of another; it was interesting to see what kind of factors in the plot would contribute to the distributions of each.

Conclusions were that loss of forest covers land degradation, species extinction, and genetic erosion is still ongoing in Indonesia, although the rate has much reduced in recent decade. Biodiversity observation activities in the country were carried out by various institutes, whether independently or in collaboration with international networks; but no formal biodiversity observation network was established yet. Botanical exploration and establishment of permanent monitoring plots at different vegetation types have continuously conducted, and mainstreaming biodiversity and ecosystem observation and services to policymaking have been identified as crucial. Many countries lacked these networks because they lacked capacity, funding and guidance. In order to support the establishment of those, the regionally tailored startup kits, 'BON in a Box,' was started, along with offering strategies to integrate data *in situ.* With that, Mr. Darnaedi concluded his presentation.

Following all of the presentations, the panel entered discussion on AP-BON's contribution to GEO BON, CBD, and IPBES.

Mr. Pereira congratulated everyone on their initiatives, noting how impressive the initiatives had been in the seven years since AP-BON was established, diversifying in accordance to their regions. He wondered what the government stance was with the organizations in each case. There were already some cases, such as in China, where government was already getting involved; but he asked if each individual network was developing in each country for more systematic involvement. Mr. Eun-Shik Kim responded that they now had missions and a focus to monitor and assess biodiversity, along with consistent services. He said it was natural to wonder about the regional bonds between each, and suggested the session the next day would be a good opportunity to learn more. Dr. Ma commented that his network was financially supported by the Chinese Academy of Science, with USD $30 million to facilitate the network. For development in terms of data management and assessment, perhaps it was 'solved', but collaboration with the Ministry of the Environment was forthcoming.

Another question came from Mr. Jorg Freyhof, the director of GEO BON. He wondered about the data flows from, for example, J-BON, and how it flowed from J-BON to AP-BON and then to GEO BON. The response was that they were discussing how to put their data for AP-BON for other networks, and that they now had international standards for exchange of data. They were following that standard, and then to share the data, J-BON will collaborate to making it part of the GEO BON. Mr. Freyhof clarified that he was asking about data that had not been fit for global use by GBIF, as they were aiming for globally-usable data. The response to that was that they were now thinking about how to deliver their data. They were thinking of a meta-database, such as Meta-Cat, like the INPP. They also had to think about how they could interoperate with other databases, and bringing them up to standard.

Another question came from a participant from the Ministry of Forestry in Cambodia. He said that a lot of communities, with their transportation and movement, could bring in non-native species to habitats; thus he wondered what they would do if they find a non-native species in their observation area and what they do with such data—if they report it to the government, or not. The answer given was that the first step was to identify what species it was in the first place; so not only the information flow mattered, but they have to identify what species actually are in the region before making any moves.

With that, Mr. Yahara closed the session. They had many challenges left, but had made tremendous progress in five years. He thought the most important point in AP-BON was to work together through various opportunities, upon which they could input their capabilities for information-sharing and creating a database. He thanked everyone for their contributions, and concluded the session at 19:50.

[END]

3．第 6 回アジア太平洋地域生物多様性観測ネットワーク(AP-BON)ミーティングの開催

3-1．開催概要（日本語・英語）

開催日：平成 26 年 10 月 10 日(金)～11 日（土）

開催会場：生物資源研究所(NIBR)(大韓民国・仁川)

参加者数：29 名

Date: October 10-11, 2014

Venue: NIBR, Incheon, Republic of Korea

Number of Participants: 29