Webinar report:
"Assessing capacity development needs for the use of DSI"
2 June 2021, 90min (Zoom)

I. Introduction

The webinar aimed to discuss different perspectives on how capacity development needs for the use of DSI look like and why it is important for the achievement of the CBD goals as well as for the SDGs. Proponents of this concept were very vocal in the 1980s discussions leading to the negotiation of the CBD. The negotiators finally opted for a transfer deal on providing GR/aTK to the North for receiving technologies and financial resources by the South under the ABS model of the CBD. In 2010, COP MOP 1 took up the pre-CBD concept as element of the strategic framework for capacity development, which includes "Capacity of countries to develop their endogenous research capabilities to add value to their genetic resources". This webinar aimed to inform about concrete options necessary for sustainable capacity development. The informal exchange among the panellists took place between Amber Scholz, Ahmed Birouk and Sunday Akile. Questions were posed by participants and the discussion was moderated by Hartmut Meyer. This report summarizes the input of the presentations, the panellists and the following discussion. All presentations are linked (https://www.abs-biotrade.info/topics/specific-issues/dsi/#c4665).

II. Presentations

Timothy Hodges, Professor of Practice at McGill University's Institute for the Study of International Development (ISID): "*the bigger picture: biotechnology, capacity building/ development in the convention on Biological Diversity – and whither DSI*"

Hodges introduced participants to this webinar by summarizing the objectives of the CBD and emphasized that conservation, sustainable use and fair and equitable sharing cannot be seen separately as they impact each other. He pointed out that at the major international negotiations there are different perspectives and views on how to implement them, underlining that differences are legitimated. Often it is assumed that the Convention is more about physical matter. However, Hodges explained that a deeper look into the CBD shows that the value of information is not discounted. He claimed that the Convention is ultimately about sustainable development. In his point of view, this is underlined by the preamble. It points out the importance of "access to relevant technologies" and the importance of access and sharing of resources which are critical to face future needs in food, health and the growing

world population. Hodges observed that many stakeholders from different parts of the world and different backgrounds forget about Art 16-19 which provides on technology-, information transfer and capacity building. A similar thing happened with the Cartagena Protocol that contains such provisions as well. However, he admits that technology transfer in international agreements tends to be difficult, as the negotiators are often not technological experts. Thus, both protocols are focussing rather on regulations (against misappropriation, biopiracy, etc.) than on facilitations. The provision on technological transfer or capacity building is mentioned, but it is not in the foreground. Hodges closed by emphasizing that a more detailed discussion on DSI is needed.

Hartmut Meyer, team leader ABS Capacity Development Initiative: "*Assessing (biotechnology) capacity development needs for the use of DSI – Overview about DSI users and use"*

Mr. Meyer briefly presented the INSDC (International Nucleotide Sequence Database Collaboration and showed how users are distributed in the world: in the first place comes China then respectively USA and India. Equally, DSI's origin in most cases is in China and respectively USA and Canada. Meyer gave a short overview of current research on DSI.

Example 1: Kim, K., Kwon, T., Dessie, T. *et al.* The mosaic genome of indigenous African cattle as a unique genetic resource for African pastoralism. *Nat Genet* **52,** 1099–1110 (2020). https://doi.org/10.1038/s41588-020-0694-2

In the study, DSI was created from African cattle, the genome of 114 individuals of 12 indigenous African cattle breeds was sequenced, more than 3.5 terabytes of sequences were uploaded to GenBank. The goal was to "open the door to sustainable crossbreed programs combining local environmental adaptation and increased exotic productivity".

Example 2: Kachienga, L., Jitendra, K. & Momba, M. Metagenomic profiling for assessing microbial diversity and microbial adaptation to degradation of hydrocarbons in two South African petroleum-contaminated water aquifers. *Sci Rep* **8,** 7564 (2018). https://doi.org/10.1038/s41598-018-25961-0

This study aimed to profile the microbial diversity of two South African petroleum-contaminated water aquifer sites and to determine the microbial adaptation to hydrocarbon degradation using a metagenomics approach. These results can be used to explore the further potential of their role in bioremediation and environmental management.

Example 3: Jaiswal S, Shukla P. Alternative Strategies for Microbial Remediation of Pollutants via Synthetic Biology. Front Microbiol. 2020 May 19;11:808. doi: 10.3389/fmicb.2020.00808. PMID: 32508759; PMCID: PMC7249858.

The Review is presenting an outlook of alternative strategies for bioremediation via synthetic biology, including exploring the prerequisites for analysis of research data for developing synthetic biological models of microbial bioremediation. Moreover, cell coordination in a synthetic microbial community, cell signalling, and quorum sensing as engineered for enhanced bioremediation strategies are described.

III. Perspectives

Amber Scholz, Ph.D Scientific Deputy to the Director at Leibniz Institute DSMZ – German Collection of Microorganisms and Cell Cultures

Amber Scholz introduced how fundamental and crucial DSI is nowadays to all kinds of life sciences. She questioned if the future use of DSI is necessarily a question of power between North and South, as the data presented by Mr. Meyer clearly showed that most of DSI origin is currently in OECD nations and is used also by researchers based in OECD countries. She pointed ou, that the same trend can be observed in BRICS and G77 countries. Most scientists use "local DSI" more often than "foreign DSI". Exploitation from North to South cannot yet be observed. However, there are important gaps. There are 35-40% fewer DSI-based publications from BRICS/G77 authors (relative to OECD). That is a problem when we want to understand biodiversity all over the world.

DSI can be an incredible capacity development opportunity because it has become affordable in recent years. In the meantime, a million-dollar sequencing machine or a huge terra-bite server became dispensable for good research. Scholz emphasized that there is more data on databases than ever can be answered by any scientist in a lifetime. DSI should rather be seen as a great chance that can be used for sustainable development. A discussion on how DSI could be used that way must be held.

Dr. Ahmed Birouk, Lecturer and researcher on plant, genetic resources, Morocco

Transfer and use of DSI beyond our control require new capacity building efforts in the following areas:

1. Better understanding of DSI
2. Science and technology
3. Analysis and processing of large data related to DSI informatics
4. Increased effective access to international databases and their use by researchers in developing countries
5. Other capacities are needed: availability of research networks links between public-private researches
6. Infrastructure, service labs, HR, etc.

Key points made :

- The national ABS framework is very important
- Capacity building is essential for DSI
- Open access is not really an advantage for countries or regions that do not have the capacity to use such information
- Capacity building in the use of GR and DSI should be integrated into broader capacity building initiatives / strategies, adapted to the needs of individual countries and research institutions

Sunday Akile, Senior Programme Officer for Legal/Policy on Biosafety NEPAD Agency/African Biosafety Network of Expertise (ABNE)

Mr. Akile outlined that access to DSI is crucial for the further development of the African continent. In this context, he explained the Pan-African vision of the Agenda 2063 of an integrated, prosperous Africa driven by its citizens and its seven aspirations.

No. 1 outlines how Africa aspires in the next 20 years to be prosperous, to have high quality of living, well-educated and skilled citizens inspired by science technology and research and innovation. Science is one of the centres of Africa's socio-economic transformation. DSI is crucial for this vision.

However, Akile emphasized that Africa needs more capacity development and infrastructure to enable their citizens to access DSI and face future African problems for example in the agricultural sector to solve food security problems. DSI offers better chances to participate in life sciences.

IV. Questions by participants

1. **Why is there so much data without an origin?**

Amber: About 60% of the global data set has a country of origin. A lot of data should not have a country of origin from an ethical point of view. For example, human data should not be associated with a country. In other cases, the origin is not appropriate. For example, model organisms that were taken out of the wild 50 or 100 years ago. About 43% of the data should have country of origin information and does not. The scientific community should start to look after it more closely. The loss of country data is not caused by misconduct but rather appears to be carelessness.

2. **Should there be capacity development of governance capacities?**

Ahmed: Governance mechanisms are highly necessary. The role and responsibility of governments and national citizenship have to be discussed. Governance is as important as technical needs. Broader capacity building is necessary.

3. **Has the African Union or AUDA-NEPAD special programs set up African institutions in biological research, taxonomy or health research or biotech research? What is the status of these efforts in the continent itself?**

Sunday: There are various centers of biological research in different regions of the continent, for example, biotechnology centers in northern Africa, Agri-Biotech in West Africa or medical research centers established in southern Africa. Those centers are some important pillars to achieve our goals from the agenda 2063.

4. **The users should contribute to benefit sharing and capacity development. What do you think of this connection?**

Amber: Universities tend to have a lot of international students from all over the world. This internal exchange is an important part of science. The question would be rather, what counts as capacity development in the context of the CBD? A mechanism has to be created to be able to counter in a real and robust way. This has to be further discussed. An interesting idea would be a matchmaking platform like tinder for scientists with a view to connecting needs across the planet.

V. Wrap-up

Dr. Chris Lyal, Taxonomist at the National History Museum, London

- To achieve some of the SDGs just like the objectives of the CBD DSI will be an indispensable tool. That is why it is important to ensure that everybody has access to DSI.
- The use of DSI is necessary to meet the objectives of the Convention, as Lyal himself used DSI to identify invasive species, which is considered a key element of managing biodiversity.
- However, can DSI be used to its real potential right now? As Amber Scholz and Hartmut Meyer presented, the main actors are currently not equally distributed.
- However, access to data banks is not enough if there is no capability to apply this data. All articles about capacity development should be working together to secure this aim.
- Capacity development comes at different levels:

1. **level: individual training** (for example in barcoding). This is important, but not enough if the trained people have no place where they can go to apply the learned capabilities afterwards
2. **level: ensure institutional homes** and ensure that those institutions are sustainable. Such sustainability will need a national policy framework.
3. **level:** endorsement by governments of those institutions.

VI. Key messages

- Generally, capacity building and the sharing of information already exists in the Nagoya Protocol, but the articles are not concrete enough to facilitate processes related to DSI. More technical advisers are needed.
- Most of DSI origin is currently in OECD nations and is used also by researchers based in OECD countries (but mostly in China, USA and India). This lack of data complicates the understanding of global biodiversity relationships.
- DSI can be a big chance for developing countries as it is becoming cheaper and more user friendly.
- Improving the scientific location in African countries is one of the centres of Africa's' socioeconomic transformation. DSI is crucial for the vision of an integrated, prosperous Africa driven by its citizens.
- New capacity building efforts are necessary:
  1. Better understanding of DSI
  2. More capacity building in science and technology
  3. Analysis and processing of large data related to DSI informatics
  4. Increased effective access to international databases and their use by researchers in developing countries
  5. Availability of research networks links, especially between public and private researches has to be improved
  6. Building institutions, infrastructure, service labs, HR, etc. has to be sustainable
  7. Endorsement by governments