



ASSOCIATION POUR LES NATIONS UNIES (APNU)



“The Living World in the Digital Age: Who Governs Genetic Data?”

International Governance of Genetic Resources and Digital Sequence Information

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The coffee you had this morning, the diabetes drug some of you might take, the moisturiser in your bathroom cabinet.

All of them exist because someone, somewhere, took a plant, a microbe, or an animal gene and turned it into something valuable.



Who owns that value, and who gets to benefit from it?



What Are Genetic Resources?

Any material from plants, animals, or microorganisms that contains genetic information of actual or potential value.

Food

crop diversity is the raw material for breeding — resistance to drought, pests, disease.

Medicine

many major drugs originate from wild species — the Madagascar periwinkle, the Pacific yew (taxol).

Cosmetics and industry

plant extracts in skincare, enzymes from extremophile microbes used in detergents and biofuels.

It's the biological foundation of food security, healthcare, and a large slice of global industry.



Colonial Extraction: The Physical Resources

- From the 16th century onward - colonial expansion
- Institutional backbone: botanical gardens
- Framing point: genetic resources were a “common heritage of humankind”, i.e free to take.



Jardin botanique de Caen, photo: Christine Frison

[Emplacement suggéré pour une photo — ex. Kew Gardens / illustration botanique coloniale]



From Plants to Patents: Capturing the Intellectual Value

1980

Diamond v. Chakrabarty
(US Supreme Court): for the first time, a
living, genetically modified organism
could be patented.

1994

The TRIPS Agreement (WTO):
made strong intellectual property
protection — including patents on
biotechnological inventions — a near-
universal global standard, enforced
through trade rules.

Whoever holds the patent captures the value; the country or community that provided the original resource and, often, the traditional knowledge pointing to its use, gets nothing.



Naming the Problem: Biopiracy

“Biopiracy” describes the appropriation, usually through patents, of genetic resources or associated traditional knowledge, without the consent of, or benefit-sharing with, the country or community of origin.

Neem (India)

patents claimed on its pesticidal properties, long known and used by Indian farmers.

Turmeric

a US patent on its wound-healing use was later revoked after India proved centuries of prior traditional use.

Hoodia (Southern Africa)

appetite-suppressant compound patented and commercialised with the San people initially left out of any benefit-sharing arrangement.

These controversies didn't stay academic: they forced governments to build a legal response at the international level.



The Response: The CBD (1992) and the ITPGRFA (2001)

Convention on Biological Diversity (1992)

The “common heritage” logic => states’ sovereign rights over the genetic resources within their territory.

Access and benefit-sharing (ABS) becomes one of the Convention's three core objectives, alongside conservation and sustainable use.

International Treaty on Plant Genetic Resources for Food and Agriculture (2001, under the FAO)

Specifically for food and agriculture

No country is self-sufficient in crop genetic diversity,

Agriculture and food security depends on resources moving freely across borders.

Although these two treaties both establish an ABS mechanism, they differ in scope and in philosophy: access is bilateral or multilateral.



ABS Mechanisms: Bilateral vs. Multilateral



CBD / Nagoya Protocol (2010): a bilateral system.

Contract

=

prior informed consent from the country of origin

+

benefit-sharing agreement



ITPGRFA: a multilateral system for Annex I crops and forages.

Access is facilitated

Standard contract

Benefits are pooled and redistributed collectively

One system works like signing an individual contract every time you want a book; the other works like a shared library where you sign one membership and can borrow from the whole collection.



Why This Matters Now: The Sixth Mass Extinction

- Biodiversity loss today is occurring at a rate and scale that many scientists compare to the five previous mass extinctions in Earth's history, but this one is driven by human activity.
- Genetic diversity is not an abstract asset: it is the raw material conservation, agriculture, and medicine all depend on to adapt to a changing planet.
- This is where ABS was meant to play a second role: not only fairness, but also a funding mechanism. The 2022 Kunming-Montreal Global Biodiversity Framework explicitly set targets for mobilising this kind of resource.

6th

MASS EXTINCTION



driven by human activity



The Disruption: Genetic Sequencing (DSI)

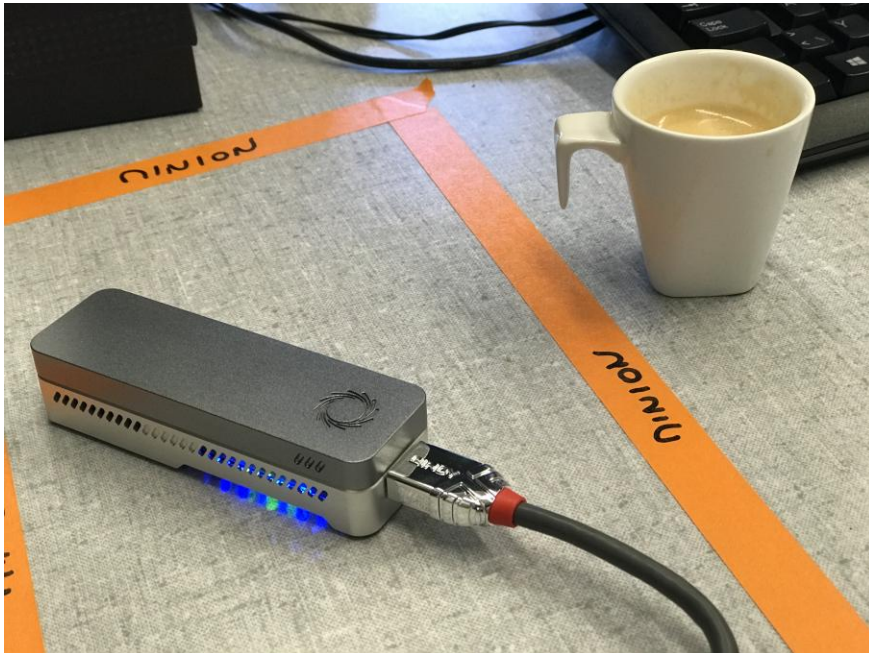
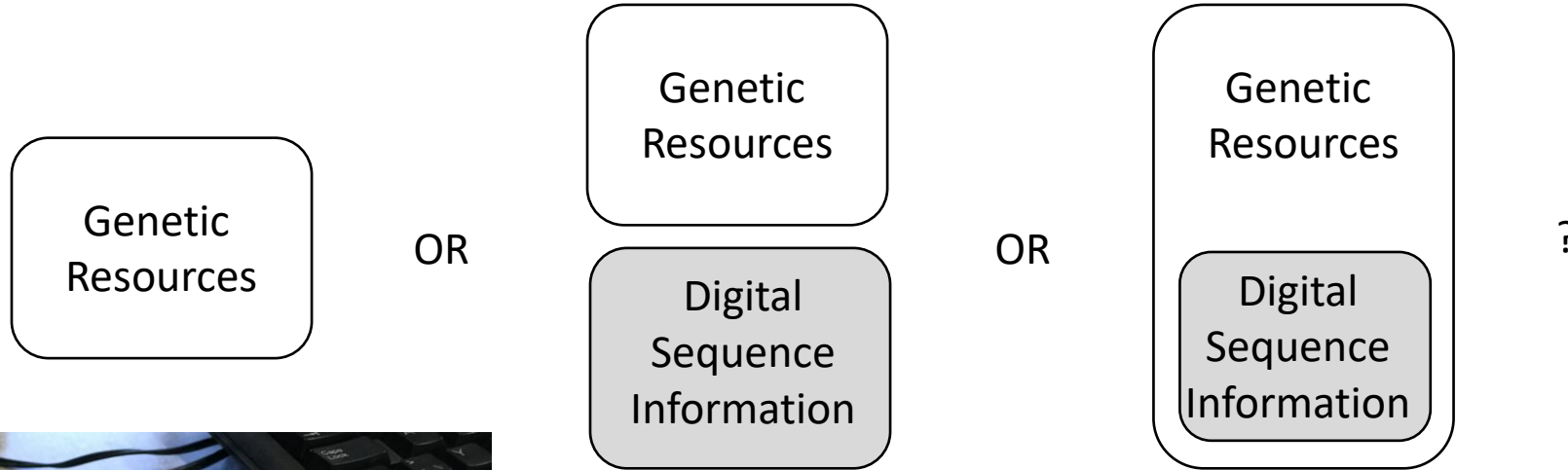
Today, technology allows scientists to read the genetic code of an organism and convert it into a string of digital data (i.e. a sequence of letters (A, T, C, G)) that can be stored, shared, and used entirely independently of the physical plant, animal, or microbe it came from.

This data is called **Digital Sequence Information (DSI)**, and it sits in public and private databases (like GenBank) accessible to researchers worldwide.

During the COVID-19 pandemic, the genetic sequence of the virus was shared globally online within days, enabling vaccine development everywhere, without a single physical sample crossing most borders.

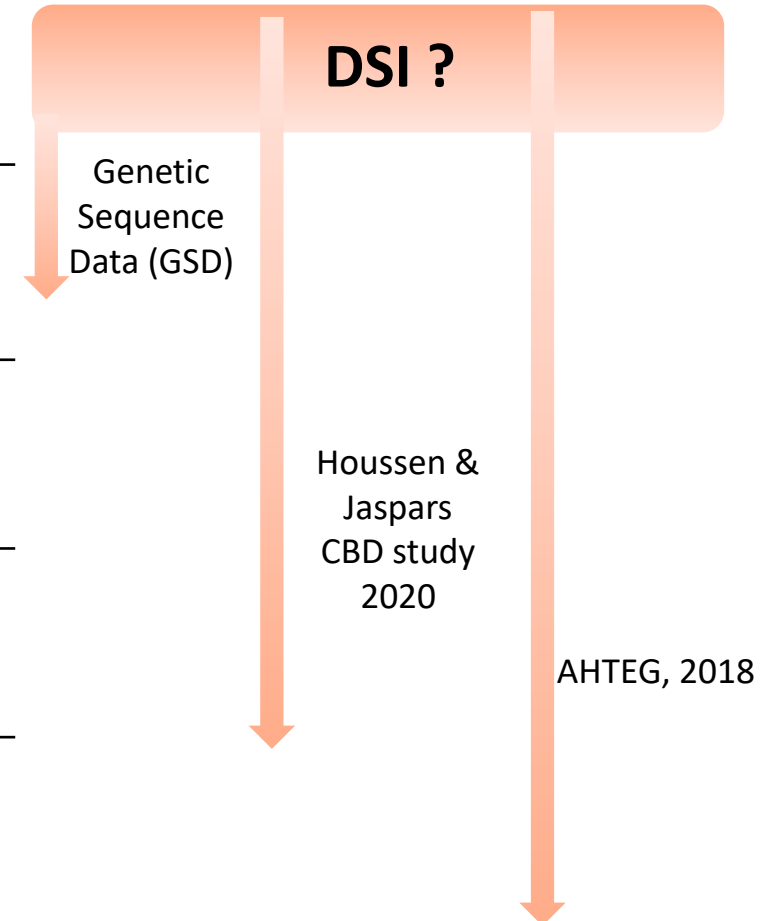
That is DSI in action, and it shows both its enormous benefits and the governance question it raises.

The heart of the controversy: Defining Genetic Resources and Digital Sequence Information

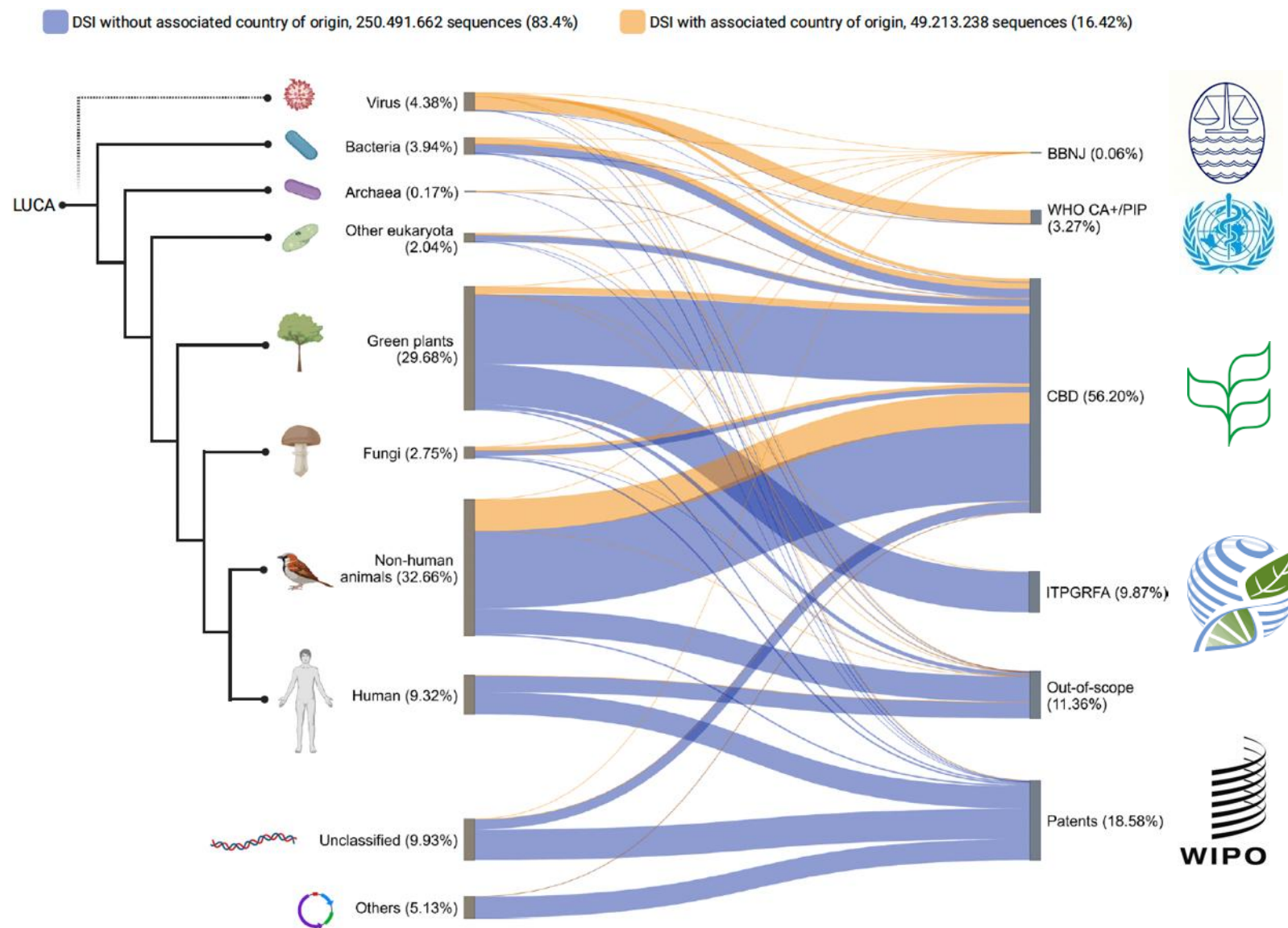


Because from the definition and scope of instruments, will depend the benefits to be shared (or not...)

DNA	GATCGAAAGGAAATTAAGACAAGGTCAAATGA CTTAAGGCGTAGGGTGGATACCTAGGCACCTAGAGA CGATGAAGGGCGTGGAACCGACGAAACGCTTCGGG GAGCTGGAAACAAGCAACGATCCGGAGATTCCCGA
RNA	GAUCGAAAGGAAAUUAAAAGACAAGGUCAAAUG ACUUAAGGCGUAGGGUGGAUACCUAGGCACCUA GAGACGAUGAAGGGCGUGGAACCGACGAAACGC UUCGGGGAGCUGGAAACAAGCAACGAUCCGGAG AUUCCCGA
Protein	MATVVLEDVPATSARSSVLTLVNSSVGAGILALPLAF SCIGWAGGLAAVAFIASTEGFTLYVLARCAESTGAR TYGALVHRLLGRRTSLLMCLATWLFYGSCCAYLMI IGDSFTPLLQHA
Metabolites	m/z (%)=1285.1 (15), 1284.1 (35), 1283.1 (50; [2 M+Na] ⁺), 1262.0 (24), 1260.9 (18; [2 M+H] ⁺), 691.0 (23; [M-H+Na+K] ⁺), 675.1 (14; [M-H+2 Na] ⁺), 671.1 (13), 670.0 (25), 669.1 (64; [M+K] ⁺), 655.3 (10), 654.2 (34), 653.3 (100; [M+Na] ⁺), 633.2 (7), 632.1 (22), 631.1 (50; [M+H] ⁺
Metadata	Aromatase, A0000036795, CHE063 Strawberry, Switzerland Earl flowering, flat fruits...



Not all DSI are equal...



- Subsets are very different
- In size,
- Scope,
- Policy relevance,
- Economic relevance,
- Stakeholders' involved



New Frontier, Old Problem: Virtual Biopiracy

DSI breaks that logic entirely: once a sequence is in a public database, it can be used, recombined, and commercialised anywhere in the world, with no physical transfer to trigger any benefit-sharing obligation.

This risks becoming a new, “dematerialised” form of biopiracy: extraction of value without consent or compensation, this time through a database rather than a ship or a patent office.



At the ITPGRFA, negotiations continue on whether and how DSI derived from Annex I crops should fall under the Treaty's Multilateral System on ABS.

The Access and Benefit Sharing regime

Genetic Resources

Terrestrial
Biodiversity

Plants for
Agriculture

Antarctic
Species

Marine
species

Influenza
virus

CBD



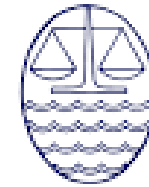
ITPGRFA



AT



UNCLOS



THE LAW
OF THE SEA

PIP



World Health
Organization

DIGITAL SEQUENCE INFORMATION

Nagoya
Protocol

Multilateral
System of ABS

Biodiversity Beyond
National Jurisdiction

Global Multilateral Benefit-
Sharing Mechanism

Open questions ?

- 1 Who benefits from the access to and use of genetic resources?
- 2 Who benefits from the access to and use of DSI?
- 3 What can be done to support biodiversity conservation in the face of the 6th mass extinction?
- 4 What can be done to enhance food sovereignty around the globe and feed world population in times of climate change?

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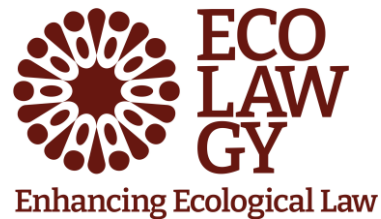
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Thank you



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