U.S. Submission on
Digital Sequence Information on Genetic Resources

18 August, 2017

Terminology

The United States understands the term "digital sequence information on genetic resources" to mean the genetic sequence data (GSD) that describe the order in which nucleotides are situated in a chain relative to one another in DNA or RNA molecules contained in genetic material of actual or potential value. We therefore will use the term GSD instead of digital sequence information (DSI) in our response. We also recommend that the AHTEG consider using GSD as a substitute for DSI when they consider terminology related to DSI.

We note that GSD are neither genetic material nor a genetic resource. It is essential to maintain a conceptual and definitional distinction between genetic material itself and data describing that material.

Use of GSD

Researchers across the globe use GSD in ways that further all three objectives of the Convention on Biological Diversity (CBD) and the objective of the Nagoya Protocol. Unimpeded and rapid access to and use of GSD are essential to the continuation of these activities. Any action that hinders the sharing and use of GSD will hinder achievement of these objectives. We have identified just a few of the many uses of GSD that further each of these objectives.

Examples

CBD objective 1: Conservation of biological diversity

Researchers use GSD to accurately identify and understand relationships between species from all over the world. For example, programs like the Barcode of Life (http://www.barcodeoflife.org/) work to genetically 'fingerprint' upwards of 10 million species, including those that have yet to be described or named. The Barcode of Life database allows researchers to identify species, a critical step for monitoring and conserving biological diversity.

GSD are critical for preventing further loss of threatened and endangered species. For example, researchers use GSD to identify, understand and mitigate factors that threaten a wide range of populations of vulnerable animal and plant species such as manatees, the Western White Pine, and the Sierra Nevada Yellow-Legged Frog in the United States. Managers of captive breeding programs for animals such as the California condor, black footed ferret, giant pandas, and golden lion tamarin rely on GSD to document genetic diversity, enabling those managers to reintroduce stable and healthy individuals to their natural habitats. Law enforcement agencies use GSD in combatting wildlife trafficking, as the data can be used to identify source populations of trafficked plants and animals. GSD describing genetic material collected from environmental samples such as soil and water also help researchers better understand the range of biodiversity in a given area.

GSD are also instrumental in rapidly identifying, monitoring, and managing invasive alien species, a significant threat to global biological diversity. For example, scientists use GSD to detect and identify non-native species and determine their respective source populations. Equipped with this knowledge, researchers can then identify the introduction pathway of the invasive alien species, and calculate the likelihood of a non-native species becoming invasive in an ecosystem. For invasive alien species that are well established and harming native plants and animals or human health, GSD might enable scientists to develop the molecular editing tools that could help reduce or eradicate a targeted population of invasive species.

CBD objective 2: Sustainable use of its components
Continued access to GSD promotes research and development efforts to increase the sustainable use of biological diversity. For example, the data stored in Kitbase, a publicly available catalogue of gene mutations found in rice, may help researchers breed optimal varieties of staple grain crops such as rice and sorghum, plus potential biofuel crops such as switchgrass.

GSD are also used to fight illegal trade such as seafood fraud and illegal logging. Seafood fraud, including mislabeling or other forms of deceptive marketing of seafood products, jeopardizes the health of fish stocks, distorts legal markets, and undermines sustainable fisheries. Using GSD to ensure that fish are properly labeled protects the sustainable use of fish species. Similarly, researchers are developing technologies that rely on GSD to identify the species and geographic origin of timber in order to detect illegal logging and trade.

GSD are critical for advancing sustainable agriculture. Farmers and plant breeders use GSD to develop new crop varieties that are more productive, resilient, and require fewer inputs such as water, fertilizers, and pesticides. For example, GSD allow researchers to identify markers for genes associated with drought tolerance in sorghum. Scientists are also using GSD to breed beans that cook more quickly. As cooking one kilogram of beans currently requires seven kilograms of firewood, a "quick cook" bean would reduce economic and environmental costs associated with this globally important source of vegetable protein.

CBD objective 3 and Nagoya Protocol objective: fair and equitable sharing of the benefits arising out of the utilization of genetic resources
As part of research best-practices, GSD are openly available via international data repositories such as GenBank and the International Nucleotide Sequence Database Collaboration, as well as in journals found in print and online. These repositories and journals further engender collaboration by providing a free flow of GSD to both researchers and to the general public. The open access and collaboration are the key benefits of GSD; regulation of access to and sharing of GSD would likely lead to a significant reduction in data sharing through these and other such mechanisms. GSD regulation could also force changes to procedures for information management within laboratories, with consequent costs and other negative implications for innovation. These dynamics would stifle research, which would then hinder activity to further CBD and Nagoya Protocol objectives.