International cooperation and coordination on issues related to Marine Genetic Resources
Current and future challenges Social and Economic Aspects

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United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea – 8th Meeting

Marine Biodiversity

• High diversity in the marine environment (coral reefs, hydrothermal vents, deep water corals)

• Largely unknown
  – Weddell Sea (CML)* - 674 isopod species (90% new spp.)
  – Deep Sea Corals – under threat, more than half are already gone
  – Genomic and bioinformatics** – 1.2 million genes - 1,800 bacterial species in the Sargasso Sea

• Difficult access
  – Shallow waters are most studied - about 5% of the world’s oceans
  – Scientific research in the high seas
    • Special technology
    • High costs
    • International cooperation

* Nature 447, 2007
Genetic Diversity

- We know less about genetic diversity than we do about species diversity
- The sea
  - Cradle of life
  - Marine organisms
    - Key to our evolutionary history
    - Main components of the Earth’s phyletic biodiversity

Sequenced Marine Metazoans

- Five species from three groups *

Vertebrates - Puffer fishes

* Takifugu rubripes
* Tetraodon nigroviridis

International Fugu Genome Consortium (four institutions)

**Sequenced Marine Metazoans**

Urochordates – Sea squirts and larvacea

*Ciona intestinalis*
- International (26 institutions)

*Ciona savignyi*
- National (four institutions)

Appendicularian
*Oikopleura dioica*
- International two institutions

**Sequenced Marine Metazoans**

Echinoderm - sea urchin

*Strongylocentrotus purpuratus*
- International several institutions
Marine Genetic Resources

• New set of tools
  – Genomics, bioinformatics and proteomics
  – Small microorganisms

• Promise for understanding
  – Species physiological responses to the environment
  – Gene-environment interactions that determine biodiversity at multiple scales

• Biotechnology
  – Aquaculture (disease control)
  – Pharmaceuticals
  – Cosmetics
  – Environmentally friendly technology

Biotechnology and Genetic Resources in Brazil

• National Policy on Biotechnology
  – Develop innovative biotechnological products and processes and build capacity within research institutions

• Approximately 1,700 biotechnology research groups
  – Human genome project – consortia institutes
  – Genetic vaccine against the dengue virus

• Very few working with MGRs
Biotechnology and Genetic Resources in Brazil

- International Cooperation
  - 12 countries
    - Argentina, France, Germany, United Kingdom, USA
  - Limited regional cooperation

Experiences from UFF

- Microbe-killing gel from a type of algae found at the “Atol das Rocas Biological Reserve” may be used to block HIV infection.
  - Preliminary lab tests - 95% efficient against HIV virus with low cytotoxicity.
  - Final product – more than 50% efficiency.
  - A product with at least 30% efficiency would help to reduce 40% of the number of new HIV cases each year in Africa.
Experiences from UFF

• A secondary metabolite from a seaweed collected at the “Atol das Rocas Biological Reserve” showed antifouling activity.

• Further studies – potential use as an environmentally friendly antifouling paint

Extremophiles from the Deep Sea

• Organism which thrives in 'extreme' conditions
• Found on the deep ocean floor, hydrothermal vents
• Genes that help the adaptation of the organism to extreme conditions
• Potential industrial application
  – Lipases – catalyze the hydrolysis of long chain triglycerides
  – Biotechnological applications
    • fat and oleochemical industry
    • biodegradable polymers
    • detergent industry
    • Cosmetics
    • production of biodiesel
  – Oceanobacillus iheyensis - Proteolytic enzymes, detergents.
Marine Genetic Resources
Legal Framework

  – Living resources + Marine Scientific Research
  – Benefit of mankind as a whole
• Convention on Biological Diversity (CBD)
  – Jurisdictional Scope
• TRIPS Agreement

Marine Genetic Resources
Legal Framework

• Marine Scientific Research
• High Seas versus International Seabed
• ABS Regime
• IPRs

• Ex-situ conservation
• Biopiracy
**Marine Genetic Resources Legal Framework BRAZIL**

- National Council for Management of Genetic Resources (CGEN)
  - Collection permits
  - Prior consent
  - Access permits
  - Contracts
- IP/C/W/474 – Doha Work Programme
  - Outstanding implementation issue on the relationship between the TRIPS Agreement and the Convention on Biological Diversity –
    - disclosure of origin of biological resources

**Marine Genetic Resources Conclusions**

- Current regimes: MSR, Marine living resources, ABS, IPRs and Common Heritage of Mankind.
- Fill the knowledge gap (enormous hole of knowledge absence) to understand oceans
- Increase international cooperation (IOC)
- Build capacity in developing States
- Resources conservation in the HS/Area
Marine Genetic Resources

Conclusions

- Ad Hoc Working Group, established by the UNGA, to be convened in 2008.
- MGRs uses beyond national jurisdiction should aim to provide benefits to all populations.

THANK YOU