Conserving Agrobiodiversity and Promoting Livelihoods: 
*The Role of Biological Diversity Act, 2002*

Dr. V. B. Mathur  
Chairperson  
National Biodiversity Authority  
chairman@nba.nic.in; vbm.ddn@gmail.com

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India is one of the World's 12 Vavilovian Centres of origin and diversification of cultivated plants, known as the "Hindustan Centre of origin of crop plants" (Vavilov, 1951).

The Northeast India, with the presence of over 130 species of primitive angiosperms is also considered as a “cradle of flowering plants” (Takhtajan, 1969).

India - Agrobiodiversity in Numbers

- Agri-horticultural crops: 167 spp
- Wild relatives of cultivated crops: 320 spp
- Land races of rice: 50,000 to 60,000
- Medicinal Plants: 7500 spp.
Species Richness in India (*Intra specific variation*)

*Local Varieties of Aromatic Pickle-Mango in Sirsi, India*

- A product of bio-cultural tradition of India

(Source: Vasudeva, 2011)
Species Richness in India (Intra specific variation)

Traditional Varieties of Rice in Wayanad

1. Marathendi
2. Koduku velliyvan
3. Vidyvan
4. Pottadadi kayarna
5. Kalladyarana
6. Kayarna
7. Mullavanne
8. Unavannan
9. Jeerakasala
10. Gandhokasala
11. Chemula
12. Cheba veliyvan
13. Cherthadi
14. Adukkan
15. Chemula
16. Veyumbala
17. Ununi kayarna
18. Thondi
19. Thomasara thond
20. Mulampuncha

Citrus spp.

Garcinia spp.
Agricultural Systems and Conservation of Agrobiodiversity

- For decades agriculture has been focused on increasing yields of commodity staple crops - often energy rich but invariably micronutrient poor
- Narrowing the global diet, people currently get 90% of their calories, protein and fat from the same 50 crops

391,000

Globally identified plant species

5,538

Number of crops used for food by humans throughout history

Rice, maize and wheat currently provide >50% of the world’s calories from plants

12 crops that together with 5 animal species provide 75% of the world’s food today
The 20th Century Scenario...

- Over the past century, farmers and breeders have used genetic diversity to breed high-yielding varieties. The Green Revolution brought new varieties and production methods to developing countries, with significant results.

- The world has been remarkable in delivering food to a growing population. But it has come at a cost.
The number of local varieties and breeds of domesticated plants and animals has decreased sharply:
‘Seed Systems Contribute Immensely’

Seed systems integrate 5 basic functions:
- Innovation
- Seed production and distribution
- Regulation
- Seed access support
- Conservation

These 5 functions can be found in any type of seed system - from farmers who rely on their own seed with occasional seed exchanges with family, neighbors and in open markets - to access seeds as well as to a fully-developed commercial seed sector.

Photo: Women in a seedbank, India. Credit: Bioversity International/P. Bordoni
Nutritional Security...

- Although India has achieved self sufficiency in food grains production in a macro sense, it also has nearly a quarter of worlds’ food insecure people.

- Further, both macro-and micro-nutrient malnutrition is widespread.

- 18.7% women and 16.2% of men are unable to access enough food to meet basic nutritional needs.

- 32% of children below five years are still underweight as per the recently related 5th National Family Health Survey Report (2019-2021)
India is also ranked 101 out of 116 countries in the Global Hunger Index, 2021.

The country is facing multiple challenges of achieving nutritional security as well as addressing:

a) declining land productivity

b) increasing land degradation and

c) loss of ecosystem services with change in land uses
The CBD is an International legally-binding treaty

1992

Cartagena Protocol

2003

Nagoya - Kuala Lumpur and Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Bio-safety

2010

Nagoya Protocol ABS - came into force on 12.10.2014

196 Parties to date (Near Universal)
Biological Resources and Emergence of ABS in the CBD

- Biological resources as Common Property Resources (pre-CBD conception)

- Large part of the world’s biodiversity (megadiversity) lies in poorer countries

- Huge quantities of bioresources continue to being harvested from the wild but equitable sharing of benefits is not adequately happening

- Local communities are involved but have limited direct/equitable benefits of collection and/or use.

- Bioresources are the base for several industries contributing to the national economy and human security (pharmaceuticals, nutraceuticals, cosmetics, agro-processing and bio-technology etc.).
CBD provides for Regulated Access to Biological/Genetic Resources

CBD Article 15 - Access to Genetic Resources:

Art.15.1. Recognizing the sovereign rights of States over their natural resources, the authority to determine access to genetic resources rests with the national governments and is subject to national legislation.

Art.15.4. Access, where granted, shall be on mutually agreed terms (MAT) and subject to the provisions of this Article.

Art.15.5. Access to genetic resources shall be subject to prior informed consent (PIC) of the Contracting Party providing such resources, unless otherwise determined by that Party.
12 Chapters, 65 Sections:

1. Preliminary (2)
2. Regulation of Access to Biological Diversity (5)
3. National Biodiversity Authority (10)
4. Functions and Powers of the NBA (1)
5. Approval by NBA (3)
6. State Biodiversity Board (4)
7. Finance Accounts and Audit of NBA (5)
8. Finance Accounts and Audit of SBB (5)
9. Duties of the Central and State Govt (5)
10. Biodiversity Management Committees (1)
11. Local Biodiversity Fund (6)
12. Miscellaneous (18)

Three-tier Biodiversity Governance in the Country (NBA, SBB, UTBC, BMC)
Institutional Structures under the Biological Diversity Act, 2002

MoEFCC

NBA
National Body

SBB’s
State Bodies (28) &
UT Biodiversity Councils (8)

BMC’s
(2,76,690)
Local Bodies
Functions of National Biodiversity Authority

- Grant of approval to access to BR & Associated knowledge
- Issues guidelines

Facilitative
- Formation of BMC
- Documentation of PBR

Regulatory

Advisory
- State & Central Govts.
- Normally traded comm.
- Threatened species
- Selection of BHS
### Jurisdiction of NBA/SBBs under the BD Act, 2002

<table>
<thead>
<tr>
<th>Activities</th>
<th>Persons u/s 3 (2)</th>
<th>Persons u/s 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research (<strong>S. 3)</strong></td>
<td>NBA</td>
<td>NA</td>
</tr>
<tr>
<td>Bio-survey and Bio-utilization (<strong>S. 3</strong>)</td>
<td>NBA</td>
<td>SBB</td>
</tr>
<tr>
<td>Commercial utilization (<strong>S. 3</strong>)</td>
<td>NBA</td>
<td>SBB</td>
</tr>
<tr>
<td>Transfer of research results (<strong>S. 4</strong>)</td>
<td>NBA</td>
<td>NBA</td>
</tr>
<tr>
<td>Intellectual Property Rights (<strong>S. 6</strong>)</td>
<td>NBA</td>
<td>NBA</td>
</tr>
<tr>
<td>Third party transfer of already accessed bioresources/ knowledge (<strong>S. 20</strong>)</td>
<td>NBA</td>
<td>NA</td>
</tr>
<tr>
<td>Sending/ carrying of biological resources outside India for research / emergency purpose (<strong>Form-B</strong>)</td>
<td>NA</td>
<td>NBA</td>
</tr>
</tbody>
</table>

- Section 7 person or entity, who is a citizen of India doing research on Indian biological resources is NOT a regulated activity under BD Act
### ‘To regulate or Not to regulate’
#### Agro biodiversity in the Multilateral Environmental Agreements

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1719</td>
<td>Thomas Fairchild – Formal Plant Breeding</td>
</tr>
<tr>
<td>1729</td>
<td>First (Vilmorin) Seed Co.</td>
</tr>
<tr>
<td>1940</td>
<td>Vavilov’s expeditions</td>
</tr>
<tr>
<td>1955</td>
<td>Ex situ Gene (Seed) Banks</td>
</tr>
<tr>
<td>1961</td>
<td>UPOV Convention</td>
</tr>
<tr>
<td>1983</td>
<td>FAO International Undertaking on PGR</td>
</tr>
<tr>
<td>1989</td>
<td>Revised Agreed Interpretation 4/89, Farmers’ Rights 5/89</td>
</tr>
<tr>
<td>1991</td>
<td>Sovereign Rights of Nations 3/91</td>
</tr>
<tr>
<td>1992</td>
<td>Convention on Biological Diversity</td>
</tr>
<tr>
<td>1995</td>
<td>World Trade Organization</td>
</tr>
<tr>
<td>1996</td>
<td>FAO Tech Conference - Global Plan of Action</td>
</tr>
<tr>
<td>2000</td>
<td>Agenda 21</td>
</tr>
</tbody>
</table>
| 2001 | International Treaty on PGRFA adopted  
| | sui generis Plant Variety Production (PPV&FR Act, 2001) |
| 2002 | Biological Diversity Act, 2002 |
| 2004 | ITPGRFA implemented |
| 2005 | Product patents regime (Pharmaceuticals and Biotech Products) |
| 2006 | ITPGRFA implemented |
| 2001 | Nagoya Protocol to CBD came into force |

‘PGR are common heritage of mankind that should be made freely available for breeding and research’

- FAO-IUPGR

‘Facilitate access to GRFA through Standard Material Transfer Agreement’

- ITPGRFA
Access to Plant Genetic Resources under different Regimes

Before 1993
Free access

Common heritage of humankind/ IUPGR/FAO

After 1993
Regulated access with PIC* and MAT**

Sovereign right of nations
CBD/UNEP

After 2004
Multi-lateral facilitated access

ITPGRFA, 2004
(only for PGRFA, with SMTA)


*PIC- Prior Informed Consent;
**MAT-Mutually Agreed Terms

GEFC Committee/NBPGR
Guidelines for implementation
‘Seed Treaty’ (ITPGRFA) and the CBD: ‘An uneasy relationship’

<table>
<thead>
<tr>
<th>Nagoya Protocol to CBD</th>
<th>ITPGRFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral</td>
<td>Multilateral</td>
</tr>
<tr>
<td>Built on the idea of national sovereignty over its natural/biological resources</td>
<td>Built on the idea of international sovereignty on plant genetic resources for food and agriculture</td>
</tr>
<tr>
<td>Covers all genetic resources and associated knowledge</td>
<td>Covers only plant genetic resources given in Annex-I</td>
</tr>
<tr>
<td>Utilization (research and development) of Genetic Resources</td>
<td>Research, Training, Breeding for food and Agriculture</td>
</tr>
<tr>
<td>Benefit sharing goes to Providers and Conservers of genetic resources</td>
<td>Benefit sharing goes to Trust Fund</td>
</tr>
</tbody>
</table>

**Inherent ABS Challenge for the ‘Seed Treaty’**
- How to construct an internationally agreed framework for the conservation and sustainable use of plant genetic resources for food and agriculture,
- and the fair and equitable sharing of the benefits, within this increasing privatization, and in the context of a continuing loss of biological diversity
Biological Diversity Act, 2002

Section 8 (1). ‘a body to be called the National Biodiversity Authority’

- DARE and DAC are Members of National Biodiversity Authority
- Four Chairpersons of NBA were from Agriculture Sector and three of them were from ICAR System itself.

CHAPETR- III NATIONAL BIODIVERSITY AUTHORITY

Committees of National Biodiversity Authority
Section 13. (1) The National Biodiversity Authority may constitute a committee to deal with agro-biodiversity.

Explanation - For the purposes of this sub section, “agro-biodiversity” means biological diversity of agriculture related species and their wild relatives
## Agrobiodiversity in the Biological Diversity Act, 2002

### [COMMERCIAL UTILIZATION]
Section 2 (f)….but does not include conventional breeding or traditional practices in use in any agriculture, horticulture, poultry, dairy farming, animal husbandry or bee keeping;

### [COLLABORATIVE RESEARCH PROJECTS]
Section 5…..sections 3 and 4 not to apply to certain collaborative research projects involving transfer or exchange of biological resources or information relating thereto between institutions, including Government sponsored institutions of India, and such institutions in other countries

### [APPLICATION FOR INTELLECTUAL PROPERTY RIGHTS]
Section 6 (3) ….the provisions of this section shall not apply to any person making an application for any right under any law relating to protection of plant varieties enacted by Parliament

### [PRIOR INTIMATION TO SBBS]
Section 7 ….provided that the provisions of this section shall not apply to the local people and communities of the area, including growers and cultivators of biodiversity, and vaids and hakims, who have been practicing indigenous medicine

### [NATIONAL BIODIVERSITY AUTHORITY]
Section 8 (4) (c) (NBA)….. a body to be called the National Biodiversity Authority…. (DARE & DAC as members).
Agrobiodiversity in the Biological Diversity Act, 2002

[COMMITTEES OF NBA]
Section 13. (1) The National Biodiversity Authority may constitute a committee to deal with agro-biodiversity.

[DUTIES OF THE CENTRAL AND THE STATE GOVERNMENTS]
Section 36 (3) The Central Government shall, as far as practicable wherever it deems appropriate, integrate the conservation, promotion and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.

Section 36 (5) The Central Government shall endeavour to respect and protect the knowledge of local people relating to biologically diversity, as recommended by the National Biodiversity Authority.

(a) “ex situ conservation” means the conservation of components of biological diversity outside their natural habitats;

[BIODIVERSITY HERITAGE SITES]
Section 37 notify in the Official Gazette, areas of biodiversity importance as biodiversity heritage sites under this Act

[DESIGNATION REPOSITORIES]
Section 39 designate institutions as repositories under this Act for different categories of biological resources.

[SECTION 40]
Exchange of designated accessions of genetic resources of crops listed in Annex-1 of the ITPGRFA has been exempted from provisions of Sections 3 and 4 of the BD Act
Agrobiodiversity in the Biological Diversity Act, 2002

[BIODIVERSITY MANAGEMENT COMMITTEES]
Section 41. (1)….Every local body shall constitute a Biodiversity Management Committee within its area for the purpose of promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganisms and chronicling of knowledge relating to biological diversity.

Explanation. - For the purposes of this sub-section,
(a) “cultivar” means a variety of plant that has originated and persisted under cultivation or was specifically bred for the purpose of cultivation;
(b) “folk variety” means a cultivated variety of plant that was developed, grown and exchanged informally among farmers;
(c) “landrace” means primitive cultivar that was grown by ancient farmers and their successors.
Collaborative Research Projects duly approved by the Government and conform to policy guidelines issued by the Central Government are exempted from Section 3 and 4 of BD Act.
### Guidelines for Designated Repositories

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Category of Biological Resource</th>
<th>Name of the Designated Repository</th>
</tr>
</thead>
</table>
| 1      | Flora (angiosperms, gymnosperms, pteridophytes, bryophytes, lichens, macro fungi, macro algae) | Botanical Survey of India and its Regional centres.  
Indian Council of Forestry Research  
(FRI, Dehradun and IIFGTB, Coimbatore;  
NBRI, Lucknow) |
| 2      | Fauna  
Fauna in Protected Areas | Zoological Survey of India and its Regional centres.  
TFRI, Jabalpur for termites, butterflies and moths  
Wildlife Institute of India, Dehradun |
| 3      | Genetic Resources  
 | NBPGR Cultivated Plants and their Wild Relatives  
NBAGR Domestic Animals  
NBFGR Fish  
NBAIM Agriculturally Important Microorganisms  
NBAII Agriculturally Important Insects, Mites, Spiders |
| 4      | Marine Flora and Fauna | NIO, Goa |
| 5      | Microorganisms | IMTECH, Chandigarh (actinobacteria, bacteria, fungi and yeasts)  
NCCS, Pune (bacteria, fungi (including yeasts), recombinant DNA materials (in the form of clones in bacterial host) and bacteriophages)  
IARI, New Delhi (fungi / blue-green algae) |
| 7      | Viruses | NIV, Pune |

All National Bureaus under the ICAR System are designated as National Repositories u/s 39 of BD Act
1. **Commercial Utilization:**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Benefit Sharing</th>
<th>Upto 100,00,000</th>
<th>100,00,001-300,00,000</th>
<th>Above 300,00,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1%</td>
<td>0.2%</td>
<td></td>
<td></td>
<td>0.5%</td>
</tr>
</tbody>
</table>

2. **Transfer of results of research:** Benefit sharing obligation is **3.0 to 5.0% of the monetary consideration.**

3. **Intellectual Property Rights (IPR):**

   - If applicant himself commercialize the process/product/innovation: 0.2 – 1.0% of Annual Ex-factory gross sale (minus govt. taxes)
   - If applicant assigns / licenses the process / product / innovation to a third party for commercialization: 3.0 – 5.0 % of the fee received in any form. And 2.0 – 5.0 % of Royalty

4. **Transfer of accessed bio-resources and AK:** The benefit sharing obligation is **2.0 to 5.0%** (following sectoral approach) of any amount and / or royalty received from the transferee.
Understanding of the Biological Diversity Act, 2002 as well as its interpretation and effective implementation is a key challenge!!!

Preparation of a document on “Frequently Asked Questions (FAQs) on the Biological Diversity Act, 2002”
4. Business Case on Mainstreaming Biodiversity in identified Public Schemes of Agriculture Sector

4.1 Review of selected schemes: strengths, weaknesses and constraints in implementation and strategies for mainstreaming biodiversity

In the ensuing section, 21 schemes related to the agricultural sector being implemented across 5 different Union Ministries have been critically reviewed for their strengths and weaknesses in terms of their structure (Table 4). A critical commentary is made on the constraints in their implementation and strategies are suggested for effective implementation of the said schemes.

This section is prepared based on extensive consultation among subject matter experts, interaction with selected senior officials from the State Development Departments from across the country and final moderation and triangulation with the stakeholders.
## Why Mainstreaming? - Biodiversity Expenditure Perspective

### Ministry of Agriculture and Farmers Welfare

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Allocation 2018-19 [In Million $]</th>
<th>BD Attribution (%)</th>
<th>BD contribution [In Million $]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rashtriya Krishi Vikas Yojana- Remunerative Approaches for Agriculture and Allied sector Rejuvenation (RKVY-RAFTAAR)</td>
<td>520.16</td>
<td>9.01</td>
<td>46.87</td>
</tr>
<tr>
<td>National Food Security Mission (NFSM)</td>
<td>244.29</td>
<td>10.13</td>
<td>24.75</td>
</tr>
<tr>
<td>Paramparagat Krishi Vikas Yojana (PKVY)</td>
<td>52.02</td>
<td>67.49</td>
<td>35.11</td>
</tr>
<tr>
<td>Rainfed Area Development (RAD)</td>
<td>33.81</td>
<td>37.5</td>
<td>12.68</td>
</tr>
<tr>
<td>National Mission on Oilseeds and Oil Pam (NMOOP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Health Card (SHC) &amp; Soil Health Management (SHM) Schemes</td>
<td>57.8</td>
<td>25.5</td>
<td>14.74</td>
</tr>
<tr>
<td>Mission for Integrated Development of Horticulture (MIDH)</td>
<td>366.42</td>
<td>24.16</td>
<td>88.53</td>
</tr>
<tr>
<td>National Bamboo Mission (NBM)</td>
<td>43.35</td>
<td>16.25</td>
<td>7.04</td>
</tr>
<tr>
<td>NMSA-Sub-Mission on Agroforestry (SMAF)</td>
<td>10.84</td>
<td>33.5</td>
<td>3.63</td>
</tr>
<tr>
<td>Sub Mission on Seed and Planting Material (SMSP)</td>
<td>47.97</td>
<td>17.11</td>
<td>8.21</td>
</tr>
<tr>
<td>Sub-Mission on Plant Protection and Plant Quarantine (SMPPQ)</td>
<td>18.68</td>
<td>37.5</td>
<td>7.01</td>
</tr>
<tr>
<td>Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)- Per Drop More Crop</td>
<td>577.95</td>
<td>15.0</td>
<td>86.69</td>
</tr>
<tr>
<td>Sub-Mission on Agricultural Extension (SMAE) under Umbrella Scheme – Green Revolution – Krishonnati Yojana</td>
<td>147.38</td>
<td>2.91</td>
<td>4.29</td>
</tr>
<tr>
<td>Sub-Mission on Agricultural Mechanization (SMAM)</td>
<td>168.37</td>
<td>7.48</td>
<td>12.59</td>
</tr>
</tbody>
</table>

### Department of Fisheries, Dairying & Animal Husbandry

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Allocation 2018-19 [In Million $]</th>
<th>BD Attribution (%)</th>
<th>BD contribution [In Million $]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rashtriya Gokul Mission (RGM)</td>
<td>43.56</td>
<td>15</td>
<td>6.53</td>
</tr>
<tr>
<td>National Livestock Mission (NLM)</td>
<td>54.91</td>
<td>20.52</td>
<td>11.27</td>
</tr>
<tr>
<td>Blue Revolution (BR)</td>
<td>91.4</td>
<td>10</td>
<td>9.14</td>
</tr>
</tbody>
</table>

### Ministry of AYUSH

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Allocation 2018-19 [In Million $]</th>
<th>BD Attribution (%)</th>
<th>BD contribution [In Million $]</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Ayush Mission (NAM)</td>
<td>72.88</td>
<td>82.5</td>
<td>60.13</td>
</tr>
<tr>
<td>Minimum Support Price for Minor Forest Produce (MSP for MFP)</td>
<td>18.78</td>
<td>15.0</td>
<td>2.82</td>
</tr>
</tbody>
</table>

### Ministry of Rural Development

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Allocation 2018-19 [In Million $]</th>
<th>BD Attribution (%)</th>
<th>BD contribution [In Million $]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA)</td>
<td>15893.66</td>
<td>21.05</td>
<td>3345.62</td>
</tr>
<tr>
<td>National Rural Livelihood Mission (NRLM)</td>
<td>830.8</td>
<td>0.62</td>
<td>5.15</td>
</tr>
</tbody>
</table>
Themes for Mainstreaming Biodiversity in the Agricultural Sector

1. Mainstreaming Traditional Varieties into gene pool: Support to ensure economic viability; Operationalize 4C continuum of conservation, cultivation, consumption and commerce; Opening niche markets for traditional foods, etc.


3. ABD vis-à-vis Climate Change Adaptation: In-site on farm conservation of traditional crops and landraces; Managing alien invasive species; Study climate analogues.

4. Organic Farming: Quality inputs (seeds, biofertilizers); Supply chain/market issues; Disincentivize chemical use; Certification issues; etc.

5. Integrated Pest Management (IPM): Efficacy & availability of biopesticides; economic and operational feasibility

6. Community Seed banks: Key to protect BD. Engage community. Natural Resource Management: INM, IWM, afforestation; soil conservation; soil health (SOC)
Sector – Specific Guidance Documents on BD Act

- Research
- AYUSH
- Cosmetics
- Seeds
- Biotechnology
The Way Ahead...

1. Preparation and Dissemination of FAQ document to clarify doubts

2. Preparation of Sector-specific Guidance Documents

3. Engage with Agricultural Sector through NAARM and other such institutions for capacity development
The Way Ahead...

- Promote better convergence between agriculture, agrobiodiversity and biodiversity sectors to ensure efficient "science-society-policy interface".

- Need to bring in a "theory of change" that focuses sustainability and resource efficiency as the central pillars for transforming both agriculture and biodiversity.
thank you...