Post IAC-2016

STRATEGIES FOR IMPLEMENTATION OF DELHI DECLARATION - AnGR COMPONENT

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Farm Animal Diversity in India - food and agriculture

Largest Livestock diversity in world

- **512 million livestock**
- **729 million poultry**
- **Largest buffalo population**
- **2ND Largest cattle & goat population**
- **3RD Largest sheep population**

Species	% of world population
Buffalo	57.2
Cattle	14.7
Goat	16.7
Sheep	6.8
Pig	1.1
Chicken	4.5

Rich in genetic diversity

- disease resistance, tolerance to high heat and humidity
- adaptation to particular agro-climatic environments
- Feed conversion efficiency, animal energy
- Specific bio-molecules

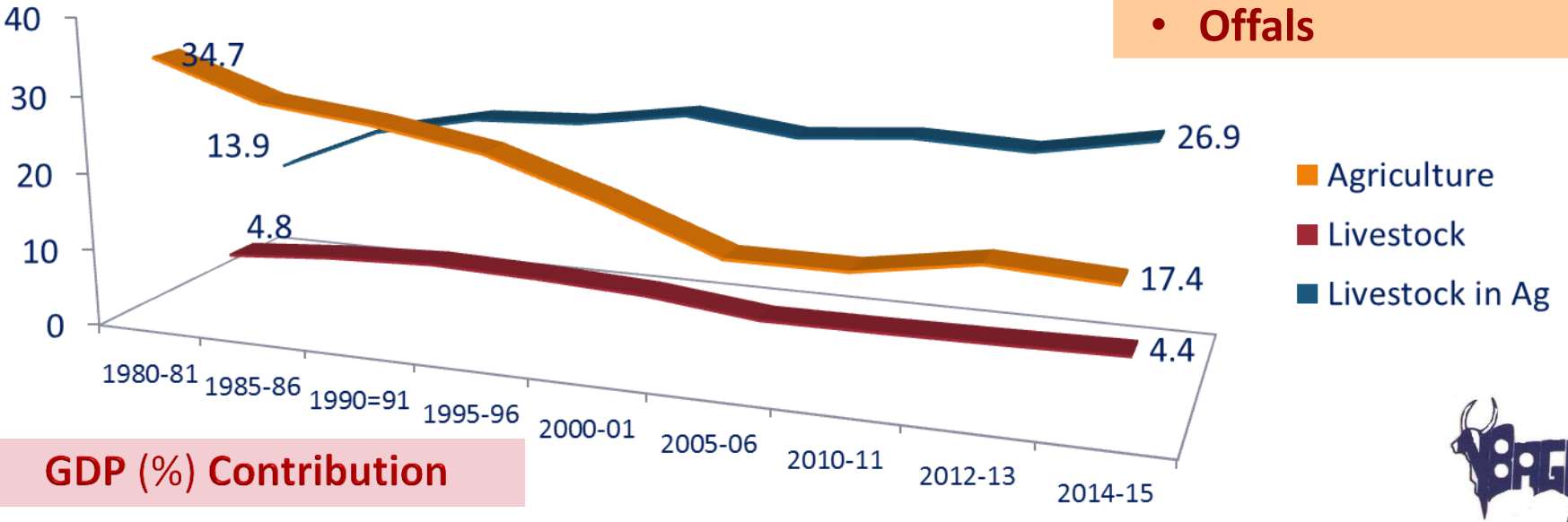
Gene pools : invaluable, worthwhile to conserve and perpetuate.

Contribution to Indian Economy

Commodity	Current price (Rs billion)	
	2012-13	2014-15
Milk - 155 MT	3497	4922
Meat - 7 MT	1066	1507
Egg - 83 B	202	239
Wool	5	5.7
Dung	372	442

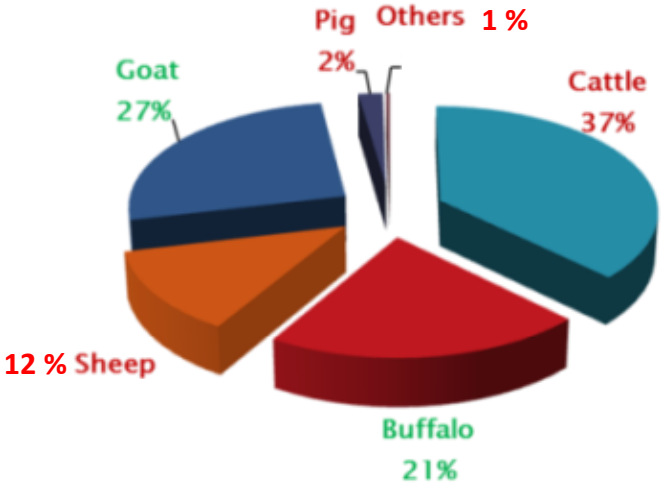
CONTRIBUTION

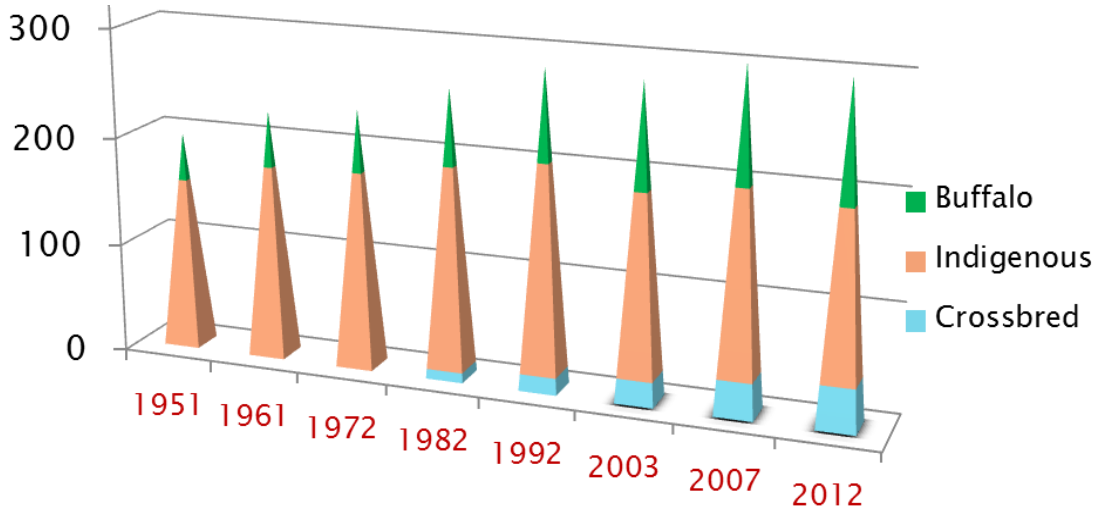
- Food: milk, meat, egg
- Draught Power
- Transport
- Employment
- Fibre
- Fuel
- Manure
- Leather &
- Offals



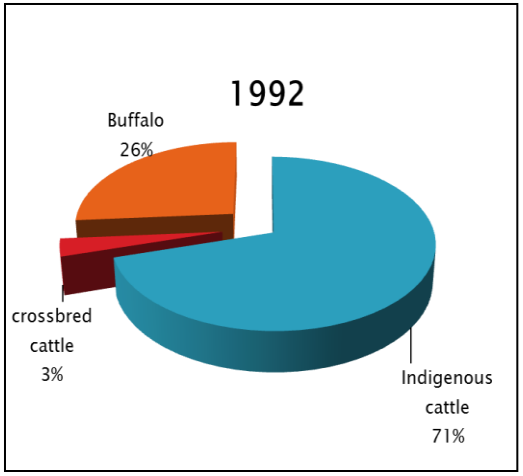
GDP (%) Contribution

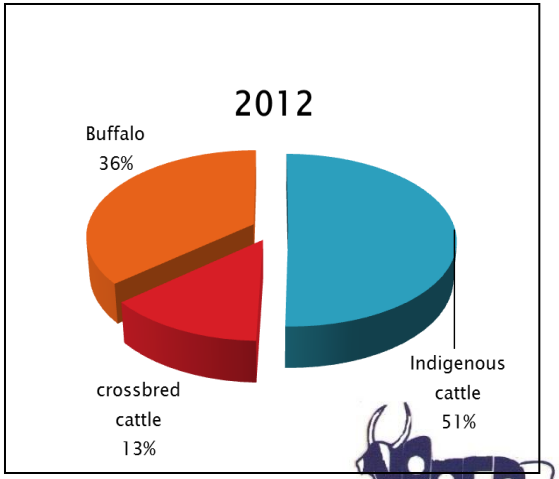
Animal Genetic Resources Scenario



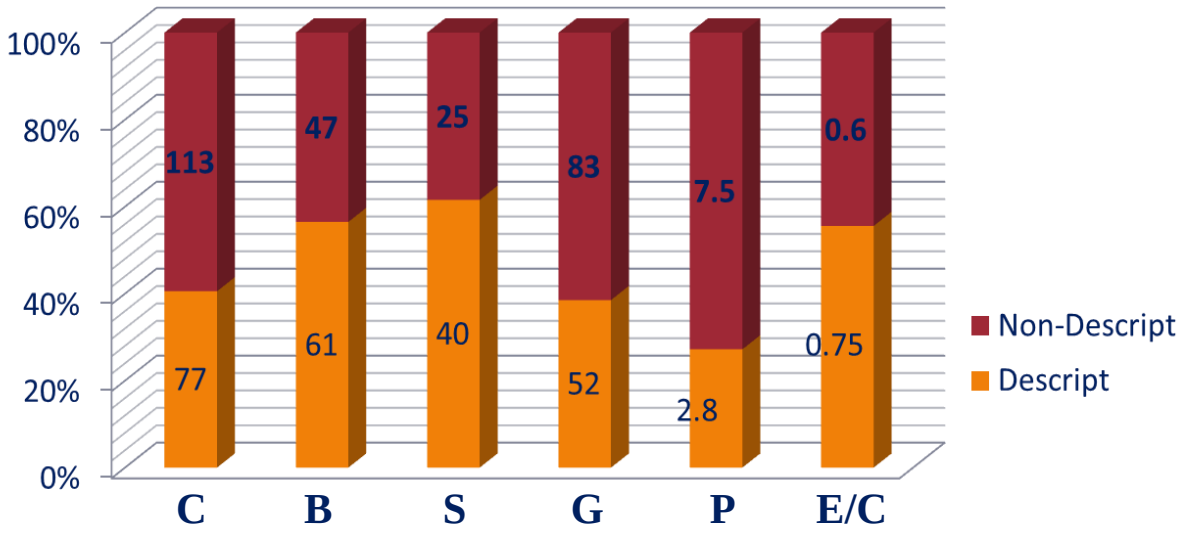


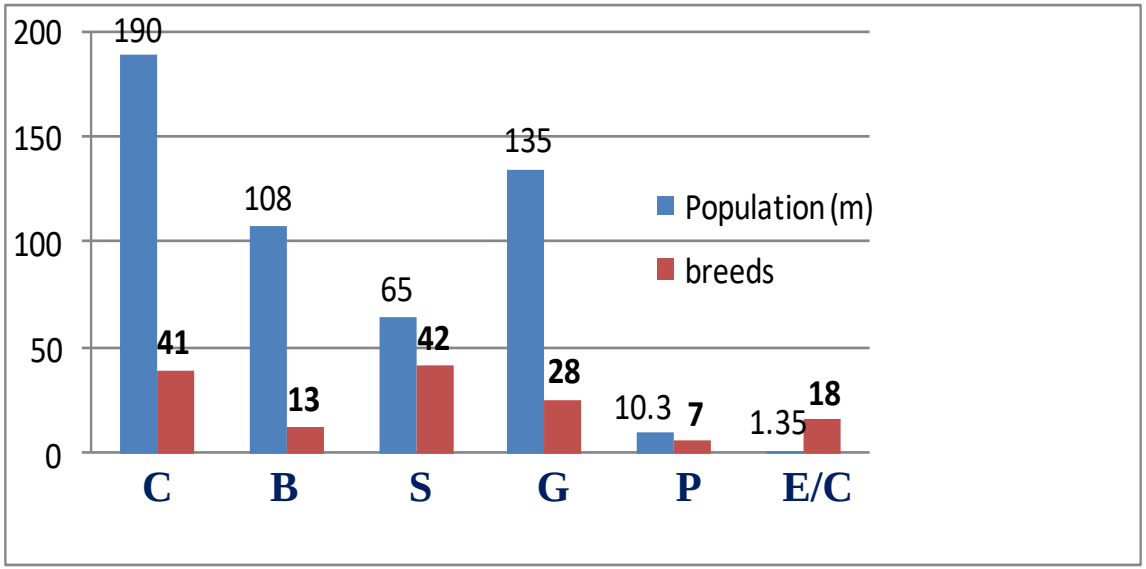
Livestock	Growth (2007-2012)
cattle	(-) 4.1%
Buffalo	3.2%
Sheep	(-) 9%
Goat	(-) 3.8%
Horses, mithun	2.0-12.9%
camel, donkey, pig, yak	(-) 7.6-27.2%
Chicken	12.4%





Animal Breed Diversity in India





Non descript population in India

Indian Livestock	: 54 %
Cattle	: 60%
Buffalo	: 45%
Sheep	: 38%
Goat	: 62%
Pig	: 73%
Equines/camel	: 44%

World:
1 breed/ million
India:
0.28 breed/ million

Identification, characterization and documentation of AnGR

- **Identification of new population:**

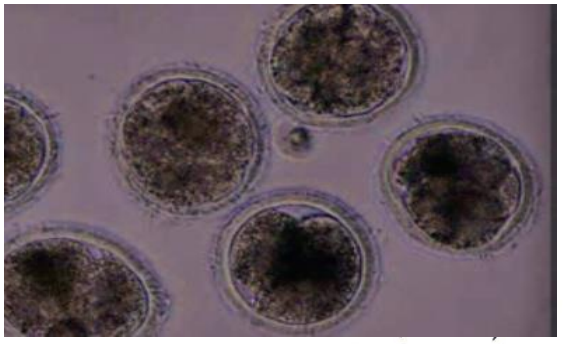
  50 new populations identified and characterized

- **Characterization of livestock & poultry breeds:**
  - **Phenotypic Characterization (136)**
  - **Genetic Characterization (133)**
    - Microsatellite based diversity analysis
    - Mitochondrial DNA based lineage
- **Registration of new breeds:**
- **Documentation of AnGR**

Species	Breeds
Cattle	41
Buffalo	13
Sheep	42
Goat	28
Camel	9
Horses	6
Pig	7
Donkey	1
Yak	1
Chicken	18
Geese	1
Duck	1
Total	168

Conservation of AnGR

- ***In-situ* conservation models**
- ***In vivo* conservation**
  - ***In situ* and ex situ conservation** of livestock and poultry **breeds**
  - **Success story** -Krishna valley cattle, Beetal goat and Kilakarsal sheep, HB Chicken
  - Breeding intervention for **harmonizing biodiversity**
- ***In vitro* conservation (National Gene Bank)**
  - **1.45 Lakh frozen semen** doses of 45 breeds of 8 species.
  - **Somatic cell preservation**
  - **Embryo preservation**
  - **Cauda-epididymal spermatozoa**
- **EST Libraries, DNA Banking**

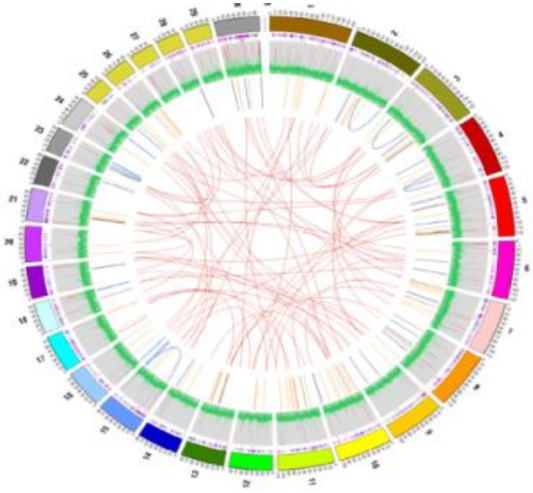


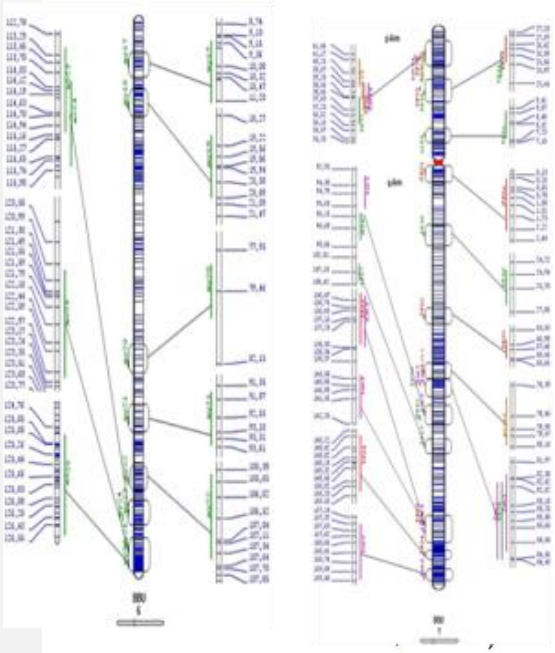
Genomics of AnGR

- **Development of Buffalo Genome Assembly**

>125GB data from Murrah.

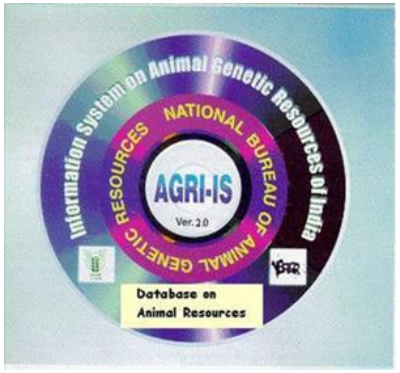
- **De - novo assembly of camel transcriptome:**
- **Generation of RNASeq data**
  - >20 lakh sequences in camel, buffalo and goat.
- **Identification of buffalo QTLs** for growth, milk traits in buffaloes
- **Development of buffalo SNPs database**
  - About 8.5 lakh SNPs of buffalo.
- **Genomics for Breed Signature**
- **Genomics for Adaptive, Fertility, Immunity Traits**
- **Molecular Analysis of Produces**
  - Milk metabolites in cattle
  - Sheep meat
  - Health Implications of A1/A2 Milk

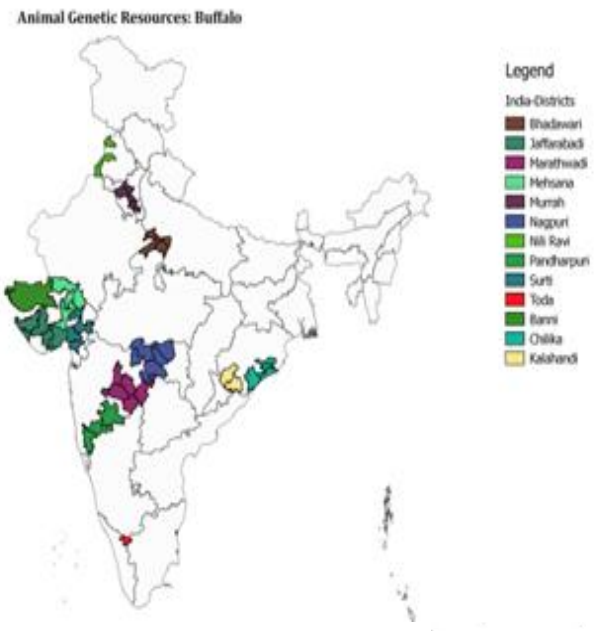




Database and Information System for AnGR Management

- **Information System on Animal Genetic Resources of India (AGRI-IS 2.0)**
- **Geographical Information System** on farm AnGR of India
- **Buffalo QTL Database**
- **Transcriptome databases** for Dromedarian and Bactrian camel
- **Genomic Database** of indigenous bovines





- **Linkage and collaboration for AnGR**
- **Policy documents for AnGR Management**
- **International collaboration**

1

We call upon nations to accord top priority to the shared vision of agro-biodiversity conservation and sustainable use towards achieving the Sustainable Development Goals (SDGs) and the Aichi Targets of the Convention on Biological Diversity addressing poverty alleviation, food, nutritional and health security, gender equity and global partnership.

Key Areas	Proposed Action Plan
Identification and evaluation of biomolecules in animal products	• Assessing **health implication of cow –buffalo A2 milk** • **Biochemical evaluation of meat** of Indigenous Goat (Black Bengal), sheep (Bandur) and poultry (Kadaknath)
Pharmaceutical and nutritional properties	• Assessing **pharmaceutical and nutritional properties** of animal products Bovine milk lactoferrin: antibacterial Camel milk: anti tuberculosis property Vechur milk: anticancer property

2

We recognize the importance of traditional agro-biodiversity knowledge available with farm men and women, pastoralists, tribal and rural communities and its central role in the conservation and use for a food secure and climate resilient world. We, therefore, call upon countries to develop the necessary legal, institutional and funding mechanisms to catalyze their active participation.

Key Areas	Proposed Action Plan
ITKs related to management of AnGR	• **Documentation of ITK databases** related to management of AnGR – Breeding, Feeding, Housing, Health Care.
Access and benefit sharing	• **Common ABS policy** for for communities rearing AnGR
Acts and regulations	• Formulation of suitable **legislation acts about** - **Protection of Animal Breeds** **- Animal Keeper's rights** **- Pasture protection** • Giving constitutional **validity of Breed registration** and Gazette notification

3

We urge researchers and the policy makers to initiate, strengthen and promote complementary strategies to conserve agrobiodiversity through use, including greater emphasis on using crop wild relatives. We call for them **to ensure a continuum between ex situ, in situ, on-farm, community based and other conservation methods** with much greater and equal emphasis .

Key Areas	Proposed Action Plan
Genetic improvement and conservation of AnGR	• Declaring livestock farms as ***in-situ*** **conservation centres** in native tract. • Formulation of long term **breeding plans for genetic improvement vis-à-vis conservation** of indigenous breeds.
Participation of Breed societies and stakeholders	• Facilitating **formation of breed societies** for participation of livestock keepers. • Development of ***in situ*** **conservation model for** indigenous cattle breeds in toto.
National Animal Germplasm Repository	• Strengthening of **National Genebank (2 Tier)** • **One state farm for each breed.** • **Networking** of institutions livestock farms.

4

We propose that researchers employ **modern technologies** including, but not limited to, genomics, biotechnology, space, computational, and nano-technologies **for genetic resources characterization, evaluation and trait discovery**. The aim must be to achieve efficiency, equity, economy and environmental security through diversified agricultural production systems and landscapes.

Key Areas	Proposed Action Plan
Reproductive biotechnologies	• Wider use of **sexed semen** • **Cloning of elite bulls** for semen production
Genomic tools	• Targeting **genome wide SNPs for trait discovery** in indigenous breeds. • Application **of genomic selection** for improving milk production • **Fortification of products** with important nutrients/elements through genetic selection, nano-technology, transgenesis
Bioinformatics & Computational Simulation.	• **Databases for Genomic information** of indigenous AnGR • Bioinformatics and computer simulation studies.

5

We reemphasize the necessity of **global exchange** of plant, animal, aquatic, microbial and insect genetic resources to diversify agriculture as well as our food basket and to meet the ever-growing food and nutritional needs of all countries. To ensure this, nations need to be catalysed to adopt both multi-lateral (as envisaged in the International Treaty on Plant Genetic Resources for Food and Agriculture) and bilateral (as per the Nagoya Protocol) instruments to facilitate the exchange **of genetic resources**, while ensuring equitable access and benefit sharing opportunities.

Key Areas	Proposed Action Plan
Germplasm Exchange	• Developing **legal mechanisms** for germplasm exchange of AnGR. • Establishing **Regional Genebank** for SAARC Countries . • Designing of mechanisms for **benefit sharing** to livestock keepers.

6

Countries are also expected to **harmonise their existing biosecurity systems**, including phytosanitary and quarantine, and enhance their capacities **to facilitate safe trans-boundary movement** of germplasm.

Key Areas	Proposed Action Plan
Biosecurity	• Strengthening **quarantine , harmonization with international standards/** guidelines • Revisiting **export-import policy related to embryo/semen of AnGR** • Establishing **NBAGR as a nodal agency for germplasm exchange Information** • Ease of norms for native germplasm exchange through **effective MTA arrangement**

7

We also expect that the governments and civil societies lay much greater emphasis on public awareness and capacity enhancement programs on agro-biodiversity conservation in order to accelerate its effective and efficient use.

Key Areas	Proposed Action Plan
Human resource development and Capacity building	• Incorporating **courses on AnGR conservation and management** at UG & PG levels. • **Capacity building and developing a cadre of professionals** to support management of AnGR on long-term basis.
Awareness programmes	• **Awareness and skill up-gradation** of livestock keepers and the stakeholders.

8

We recommend the development and implementation of an Agrobiodiversity Index to help monitor on-going genetic resource conservation and management efforts, with particular emphasis on agro-biodiversity hot spots.

Key Areas	Proposed Action Plan
Monitoring	• Identifying **breeds under threat** based on census and sample surveys • **Monitoring population trends** for threatened breeds and preparation of **national watch list**. • Developing **early-warning and response systems** • Establishing **National Register** (database) of breeders/communities
AnGR Diversity hot spots	• Designating country-wide regions as "**Hot spots**" for AnGR biodiversity preservation

9

It is also urged that public and private sectors and civil societies henceforth actively invest in and incentivize the utilization of agrobiodiversity to mitigate malnutrition, increase the resilience and productivity of farms and farming households and enhance ecosystem services. Such efforts should lead to equitable benefits and opportunities, with particular emphasis on women and youth.

Key Areas	Proposed Action Plan
Incentive	• Incentivizing to encourage the use of AnGR in **organic farming.** • Instituting National level **Breed Conservation Award** for livestock keepers.

10

We urge countries to reprioritize their research and extension with **increased investments to support the conservation** and use of agrobiodiversity. Furthermore, we strongly recommend to create an **International Agro-biodiversity Fund** as a mechanism to assist countries and communities in scientific in situ and ex situ conservation and enhanced use of agrobiodiversity.

Key Areas	Proposed Action Plan
Funds for preserving AnGR diversity	• **Regular financial support** for research in livestock biodiversity. • Creation of **International, national and state fund** for management of animal genetic resources.

Thanks !!!

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