The role of institutions in delivering the dual agenda of conservation and food security: the case of Ethiopia

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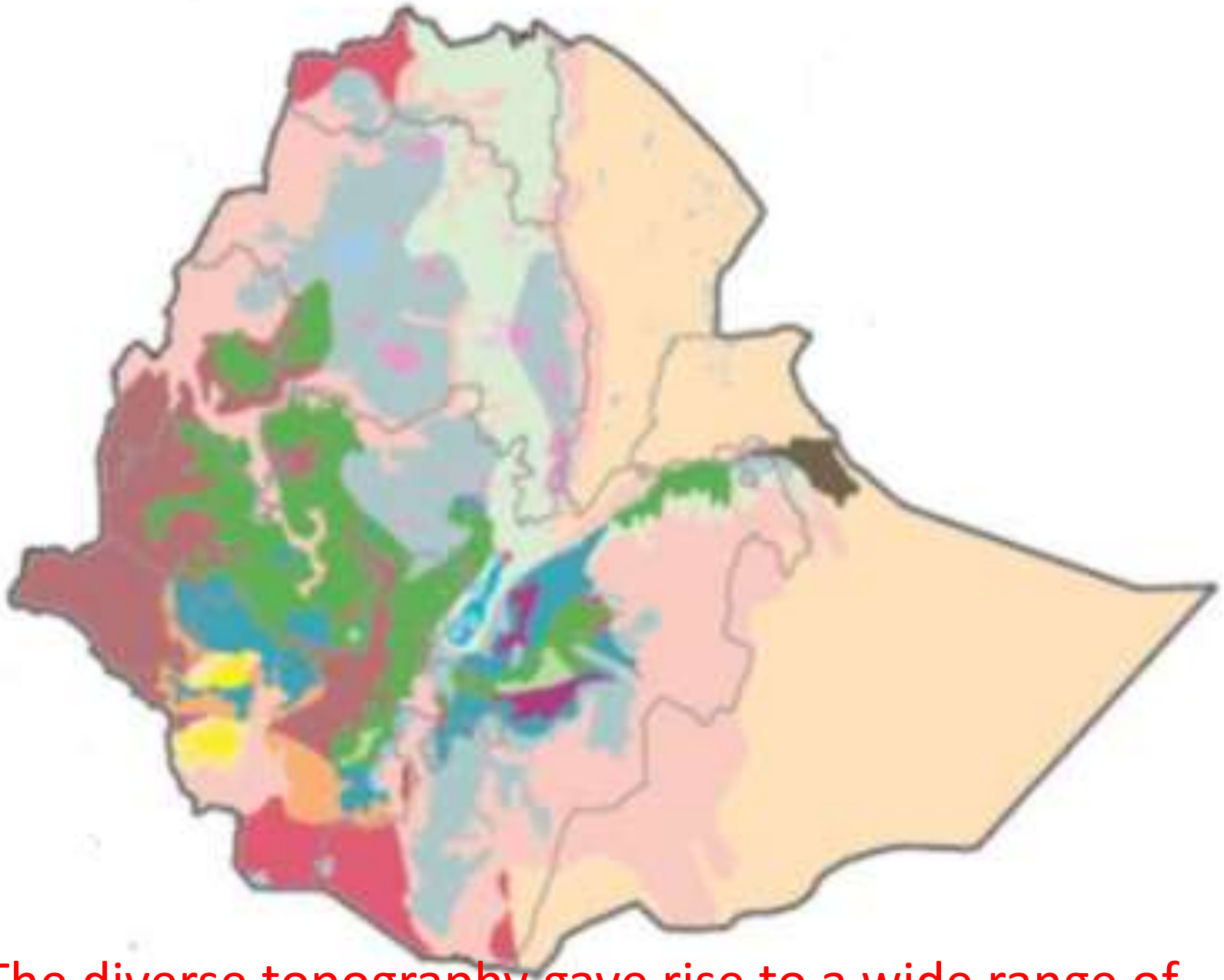
Introduction

- Ethiopia is a country of great geographical and climatic diversity, which has given rise to many and varied ecological systems.
  - 1,104,300 sq. km
  - center of origin and diversity for many biological resources including agricultural biodiversity (agrobiodiversity)
  - Significant number of endemic plants, animals and microbial genetic resources

Biodiversity Resources

- Ethiopia is one of the top 25 biodiversity-rich countries in the world
- hosts two of the world's 34 biodiversity hotspots, namely: the Eastern Afromontane and the Horn of Africa hotspots.



The diverse topography gave rise to a wide range of altitude and other environmental factors

The Great Genetic Treasure Map

This map shows the twelve areas around the world—called centers of diversity—that hold the greatest concentration of germplasm important to modern agriculture and world food production. While evidence indicates that some of the crops listed originated in their respective centers, no one knows for sure exactly where most crops first got started.

New World Centers

1 Mexico-Guatemala
Amaranth
Beans (various)
Corn
Cacao
Cashew
Cotton
Guava
Papaya
Red pepper
Squash
Sweet potato
Tobacco
Tomato

2 Peru-Ecuador-Bolivia
Beans
Cacao
Corn
Cotton
Guava
Papaya
Red pepper
Potato
Quinine
Quinoa
Squash
Tobacco
Tomato

3 Southern Chile
Potato
Chilean strawberry

4 Brazil-Paraguay
Brazil nut
Cacao
Cashew
Cassava
Para rubber
Peanut
Pineapple

5 United States
Blueberry
Cranberry
Jerusalem artichoke
Pecan
Sunflower

Old World Centers

6 Ethiopia
Banana
Barley
Castor bean
Coffee
Flax
Okra
Onion
Sesame
Sorghum
Wheat

7 Central Asiatic
Almond
Apple
Apricot
Broad bean
Cantaloupe
Carrot
Chick pea
Cotton
Flax
Grape
Hemp
Lentil
Mustard
Onion
Pea
Pear
Sesame
Spinach
Turnip
Wheat

8 Mediterranean
Asparagus
Beet
Cabbage
Carob
Chicory
Hops
Lettuce
Oat
Olive
Parsnip
Rhubarb
Wheat

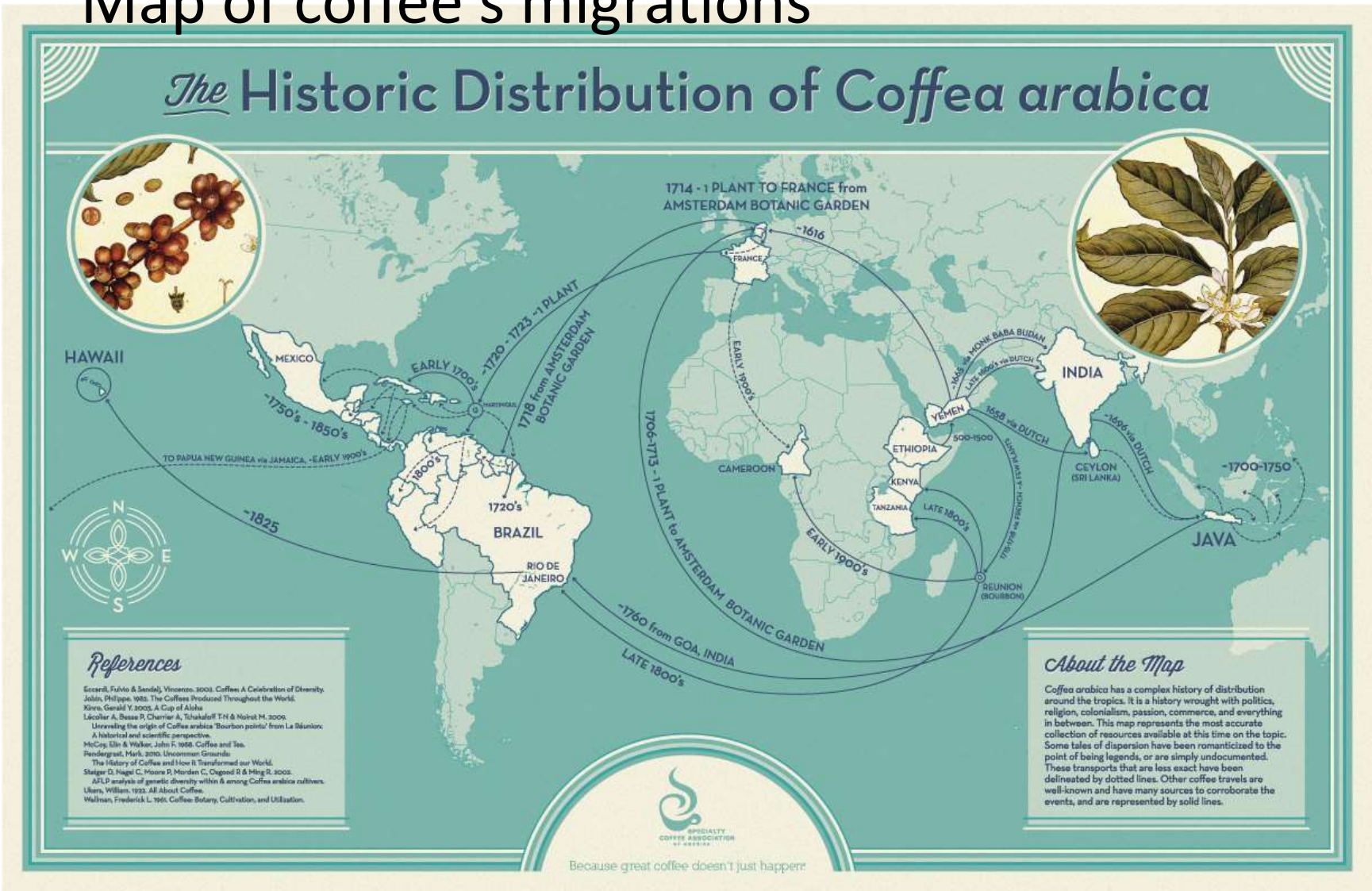
9 Indo-Burma
Amaranth
Betel nut
Betel pepper
Chick pea
Cotton
Cowpea
Cucumber
Eggplant
Hemp
Jute
Lemon
Mango
Millet
Orange
Black pepper
Rice
Sugar cane
Taro
Yam

10 Asia Minor
Alfalfa
Almond
Apricot
Barley
Beet
Cabbage
Cherry
Date palm
Carrot
Fig
Flax
Grape
Lentil
Oat
Onion
Opium poppy
Pea
Pear
Pistachio
Pomegranate
Rye
Wheat

11 Siam, Malaya, Java
Banana
Betel palm
Breadfruit
Coconut
Ginger
Grapefruit
Sugar cane
Yam

12 China
Adzuki bean
Apricot
Buckwheat
Chinese cabbage
Cowpea
Sorghum
Millet
Oat
Orange
Peach
Radish
Rhubarb
Soybean
Sugar cane
Tea

Map of coffee's migrations



Source: The Specialty Coffee Association of America

Still wild and organic Coffee in our Natural Forests

Biodiversity and Agriculture

- The major challenge for agriculture is to ensure:
  - food security, adequate nutrition and stable livelihoods for all, now and in the future,
    - by increasing food production while adopting sustainable and efficient agriculture, sustainable consumption of resources, and
  - conservation of biodiversity.

Biodiversity and Agriculture

- The FAO estimates a 70% increase in food production is needed to feed a projected population of 9.1 billion people by 2050
- GBO4 - the status of biodiversity will continue to decline
- drivers linked to agriculture account for 70 % of the projected loss of terrestrial biodiversity.
  - Solutions for achieving sustainable farming and food systems include sustainable productivity increases by restoring ecosystem services in agricultural landscapes, reducing waste and losses in supply chains, and addressing shifts in consumption patterns

Agrobiodiversity

- is the result of natural selection processes and the careful selection and inventive developments of farmers, herders and fishers over millennia.

Legal and Institutional considerations

- Coffee, oil crops (sesame) and live animals has been major export commodity.
- The Government of Ethiopia recognizes the importance of biodiversity and has put in place necessary institutional and legal frameworks that govern conservation, sustainable use and access to genetic resources and the fair and equitable sharing of benefit arising from their use.

Ethiopia Policy Directives

- In order to plan, develop and reorient biodiversity conservation and development-related activities in the country and create an integrated national biodiversity program, a functional national biodiversity networking system will be created

Policy Directives ---

- The Federal and Regional Governments will ensure the integration of biodiversity conservation and sustainable use related education into the educational system and the creation of awareness on biodiversity issues at the individual, family and community levels

Ethiopian experiences in Institutional setups: Ministerial level

- Ministry of Environment, Forest and Climate Change
- Ministry of Agriculture and Natural resources
  - Watershed management and rehabilitation/restoration of degraded ecosystems
- Ministry of Livestock and Fisheries
  - Included many targets that address conservation and sustainable use of local breeds (e.g. controlled cross breeding and selection and improvement of local breeds)
    - Community based animal breeding

Ethiopian experiences in Institutional setups: Ethiopian Biodiversity Institute

- EBI is nationally mandated for the implementation of:
  - Convention on Biological Diversity (CBD),
  - International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA),
  - Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable benefit Sharing Arising from their Utilization and
  - IPBES.

EBI at Federal level

- Crop and Horticulture Biodiversity Directorate
- Forest and Rangeland Plants Directorate
- Animal Biodiversity Directorate
- Microbial Biodiversity Directorate
- Genetic Resources ABS Directorate
  - All components of Biodiversity in a single Institute

EBI at Regional level

- Seven Biodiversity Centers
- Two Botanical Gardens
- One Duplicate Gene Bank
- 23 Community Seed Banks for on farm conservation
- 17 Field Gene Banks
- 16 forest genetic Resources *in-situ* conservation sites

Major achievements - Conservation

- 112,266 accessions of 1021 species conserved in National Gene Bank
  - Crop: 69, 547 accessions of 52 species - cold room (-10 and +4 ^{0}C) (cereals, pulses, oil crops)
- 7564 accessions of 660 species – in Field Gene Banks
  - 6680 accessions - coffee, root and tuber crops, spices -field gene banks.

Major achievements - Crop

On-farm conservation

- 23 community seed banks have been established + crop conservation associations are established (legal certificates).

- Farmers' varieties of 21 crop species have been conserved in the CSBs and on-farm conservation sites.

- Farmers' varieties - lost from the hands of the farmers were restored from the national gene bank.

Conservation and Agricultural production

Enset field gene bank

Major achievements - Crop

- 177, 470 accessions have been distributed to different users - Research, Breeding
  - Contributing to activities related to ensuring food security

Crop type	Variety	EBI accession
Barley	Agegnehu	**Acc. 218950**
	Shire	**Acc.3297**
	Estayish	**Acc.218963**
	Dimtu	**Acc.3369**
Emmer wheat	Commesso	**Acc-224881-2**
	Sinana	**Acc-216074-1**
Sorghum	Chare	**Acc.222880**
	Raya	**Acc.22287** x kat369-1
	Miskir	**Acc.69441** x p-9401
Field pea	Urji	**Acc.32615-1**
	Tullu-Dimtu	**Acc.32640-1**
	Tulllu-shenen	**Acc.2121-1**
Noog	Ginchi-1	**Acc.227187**
	Shambu-1	**Acc.228423**
Linseed	Kassa-2	**Acc.10306** X Chilalo14/3
	Tolle	CI2698 x **Acc. 13611**/B
	Berene	**Acc. 013627**

High potential in farmers' varieties

- the Seeds for Needs approach that had been undertaken by Bioversity International in Ethiopia has been proven to be a cost effective solution to climate change adaptation as it provided fast solutions to counter climate variability compared to improved varieties in use.
- Research activities lead by Bioversity International in collaboration with EBI and supported by ITPGRFA have showed the high potential in farmers' varieties both in terms of productivity and quality.
  - >20% of the Ethiopian farmers' varieties performed better than high yielding varieties specifically for drought resistance, one variety yielded 61% better than the best high yielding commercial variety.

GR ABS

- Permits for Basic Research 437
  - Free of any charge
- Benefit sharing agreements on 13 species

Trade-offs and commonalities

- **Trade-offs and commonalities between the priorities of the biodiversity conservation and agricultural center**
- **Trade-offs**:
  - Management/land use decision leading to an increase in one service and a decrease in some other service or services.
  - Trade-offs among ecosystem services can generate **conflicts** in natural resource management, development, and planning.

Trade-offs

- **In Earlier time, Agriculture and biodiversity** have often been regarded as separate **concerns**. Eg. The case of green revolution
- Even this days, biodiversity species are being threatened on lands wherein agricultural production is done in the name of securing food availability.
- The general threats to biodiversity are
  - Deforestation and habitat fragmentation
  - Encroachment
  - Pollution
  - Invasion of alien species
- Therefore agriculture emerges the greatest threat to biodiversity.

National level Institutions for dual purpose

- It is known that the extremely poor and food-insecure populations reside in countries **with the largest biodiversity resources.**
- The national institutional arrangements should be organized to address both food security and biodiversity conservation concerns through the instruments of **linkages, local knowledge facilitation, social capital and education.**
- **In addition**, research is required to alleviating food insecurity **without** compromising natural biodiversity resources.

Ethiopia's AGB: Threats

- Despite the national and international importance, Ethiopia's agrobiodiversity is highly threatened by environmental degradation, which poses a serious challenge to the development potential of the country.

Threats: key challenges

- land degradation, deforestation, habitat conversion and the consequent loss of "wildlands" which harbor wild relatives, and the replacement of farmers' varieties (FV) with hybrid high yielding varieties (HYV).
- Climate change

Extension packages for farmers' varieties

- In response to growing demand for food, the country's extension service places a high emphasis on high yielding varieties even in areas where FV are better suited.
- Through existing Institutions, extension packages for some agrobiodiversity crops developed and made ready for use.

Institutions for Market linkages

Cooperative's - Fiber purchase

Coffee

Implementation of ITPGRFA and NP in Ethiopia

- Ethiopia is addressing the implementation of the ITPGRFA and NP on ABS by putting in place Institutional and Legal Frameworks
- Legal Frameworks
  - After ratifying the CBD and ITPGRFA in 1994 and 2003 respectively, Ethiopia has issued Access to Genetic Resources and Community Knowledge and Community Rights Proclamation (No.482/2006) and Regulation (No.169/2009).

Institutional Frameworks

- **Ethiopian Biodiversity Institute (EBI) is mandated for the implementation of the ITPGRFA and NP on ABS.**
- **To effectively implement ABS issues, EBI has established GR ABS Directorate as core process since 2010.**
- **The Directorate is mandated (authorized) to regulate GR transfer (access to GR) and to ensure that the country and its communities get fair and equitable share of benefits arising from the utilization of their GRs.**

Conclusion

- Increase in food production for the ever increasing population is critical.
- Agricultural production systems need to focus more on the
  - effective conservation and management of biodiversity and
  - ecosystem services
- in order to address the twin objectives of environmental sustainability and food security.

Conclusions ---

- Mainstreaming is key! But what ? How? To mainstream in different sectors???
- Coordinated action with the bigger vision and targets
- **Knowledge** from biodiversity science and agricultural research and development need to be **integrated through a systems approach**.
  - **coordinate efforts at the conceptual and implementation levels to achieve more sustainable agricultural systems**.
  - A clear programme of work on managing landscapes and ecosystems for biodiversity conservation and food security should be central to development aid

Thank you very much!