

Leveraging synergies from integrative land-biodiversity-climate action

Preliminary results for discussion

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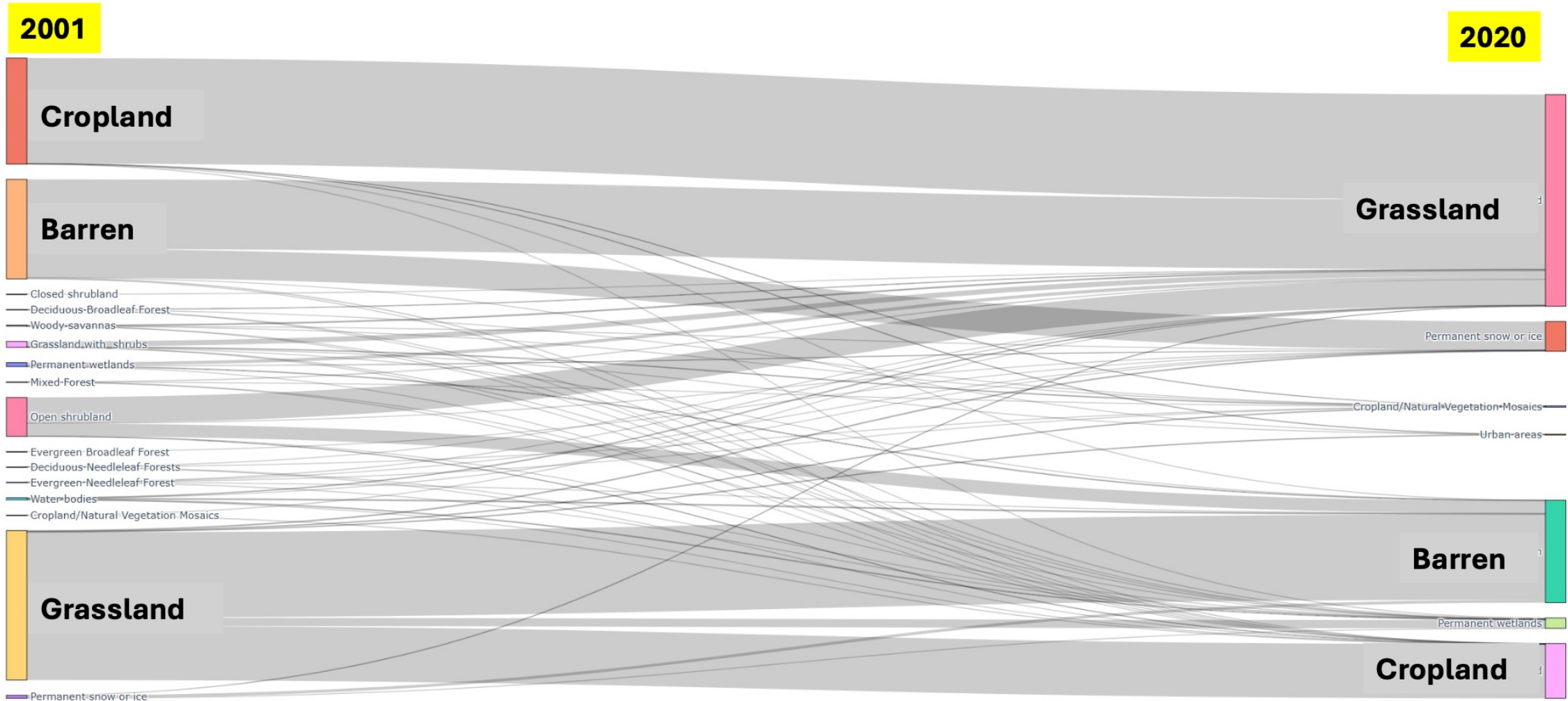
Research objectives

- Extent and cost of land degradation in Central Asia
- Financing needs and gaps for land restoration
- Most profitable locations for land restoration
- Comparison of segmented vs. coordinated land restoration
- Policy-relevant evidence for coordinated action on land

Data Sources

- **Land use and land cover data:** MCD12Q1 MODIS/Terra+Aqua Land Cover Type Yearly L3 Global 500m SIN Grid V006
- **Economic values of ecosystem services:** ESVD, ZEF-ELD datasets, own compilations
- **Costs of land restoration actions:** ECON-WOCAT, ZEF-ELD, + own compilations
- **Carbon data:** Spawn and Gibbs (2020)
- **Transaction costs:** expert interviews, REMA budget and planning documents

Land use and land cover changes from 2001 to 2020



Source: MODIS Satellite data

Summary of key changes

Land degradation

- Grassland to Barren land
= 3.83 million ha

Shrubland to grassland/barren land = 0.17 million ha

Wetland losses = 0.25 million ha

Forest losses = 0.32 million ha

Land improvement

- Barren land to Grassland
= 3.12 million ha

Wetland gains = 0.45 million ha

Forest gains = 0.13 million ha

Change with diverging implications: Cropland to Grassland = 4.74 million ha
Grassland to Cropland = 2.43 million ha

Analytical approach

- Firstly, tracked the extent and costs of land degradation through land use and land cover change (2001-2020).
- Secondly, compared the costs and benefits of restoring the degraded lands.
- Thirdly, in the process of developing modelling scenarios for synergies.

Extent and costs of land degradation

- Land use and land cover data from MODIS satellite data, dividing Central Asia into 2.5 million parcels of 11 hectares each where land use/cover changed.
- Analysed changes in the areas of forests, woodlands, shrublands, wetlands, grasslands, croplands, and barren lands between 2001-2021.
- Used available information on total economic values of each of these ecosystems and their restoration costs.

Ecosystem services

Provisioning services	Regulating services	Habitat services	Cultural services
Food Water Raw materials Genetic resources Medicinal resources Ornamental resources	Air quality regulation Climate regulation Disturbance moderation Regulation of water flows Waste treatment Erosion prevention Nutrient cycling Pollination Biological control	Nursery service Genetic diversity	Esthetic information Recreation Inspiration Spiritual experience Cognitive development

Costs of land restoration

Land restoration costs	Forest	Wood/shrub-land	Wetland	Cropland	Grassland
Ecosystem values, USD/ha	7044	2841	6676	2874*	2000
Establishment costs (USD/ha)	773	300	3726	663	500
Maintenance costs (USD/ha)	178	178	186	46	115
Survival rate	60%	60%	100%	100%	60%
Establishment years	30	10	10	1	1

How land degradation/improvement is calculated?

- Ecosystem value in 2020 – Ecosystem value in 2001 = LD or LI
- LD, land degradation if < 0
- LI, land improvement if > 0

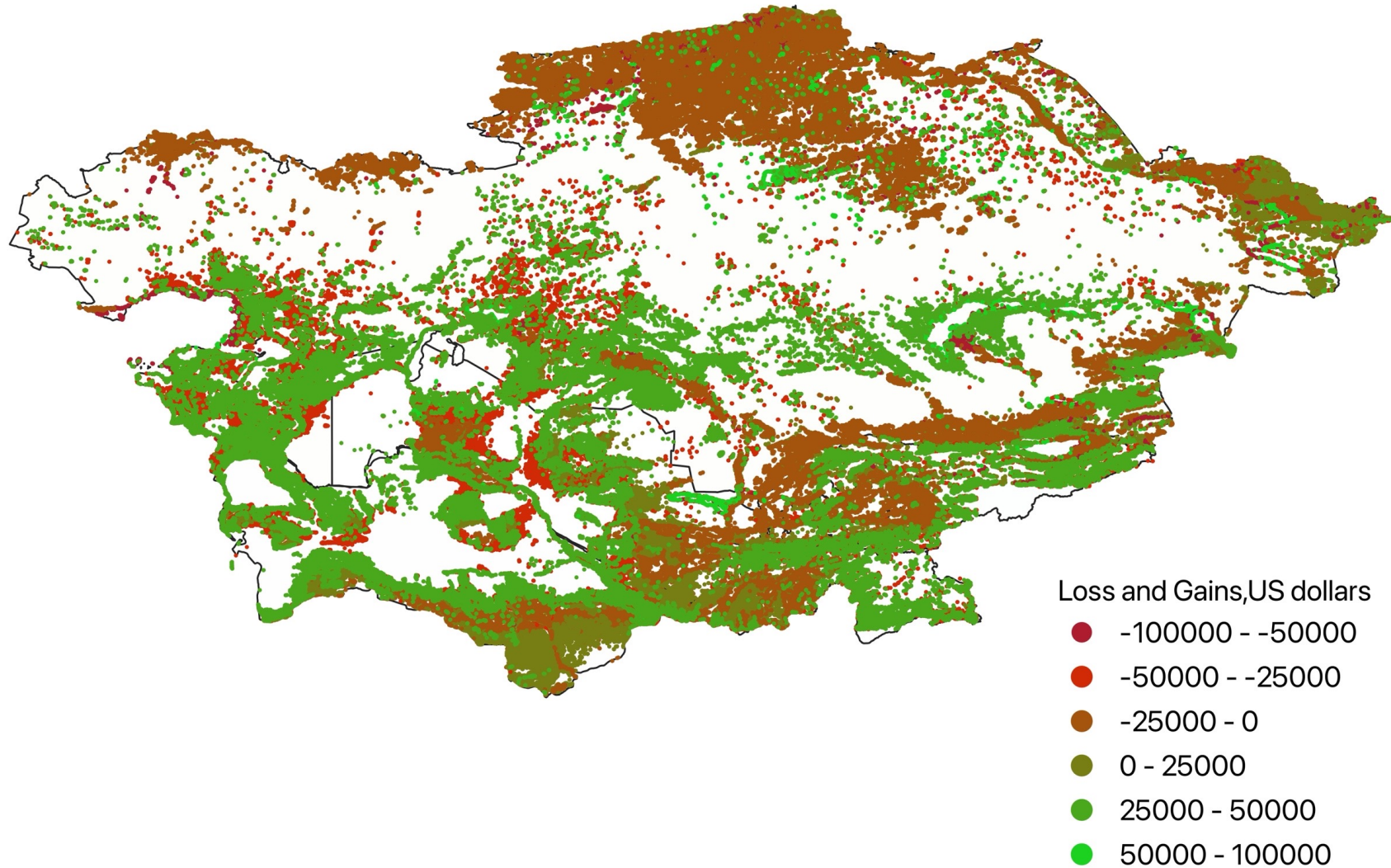
Losses from land use and cover change

During 2001-2020, in million US dollars

Countries	Forest and shrub land degradation	Grassland degradation	Wetland degradation	Cropland degradation	Total
Kazakhstan	1579	4184	1189	3711	10670
Kyrgyzstan	43	276	26	213	560
Tajikistan	54	166	3	67	290
Turkmenistan	2436	1401	23	166	4028
Uzbekistan	530	2457	50	231	3270
Central Asia	4642	8484	1291	4388	18818

Annual costs of about 1 billion US dollars for Central Asia

Hotspots of land degradation and bright spots of land improvement



How land restoration costs are calculated?

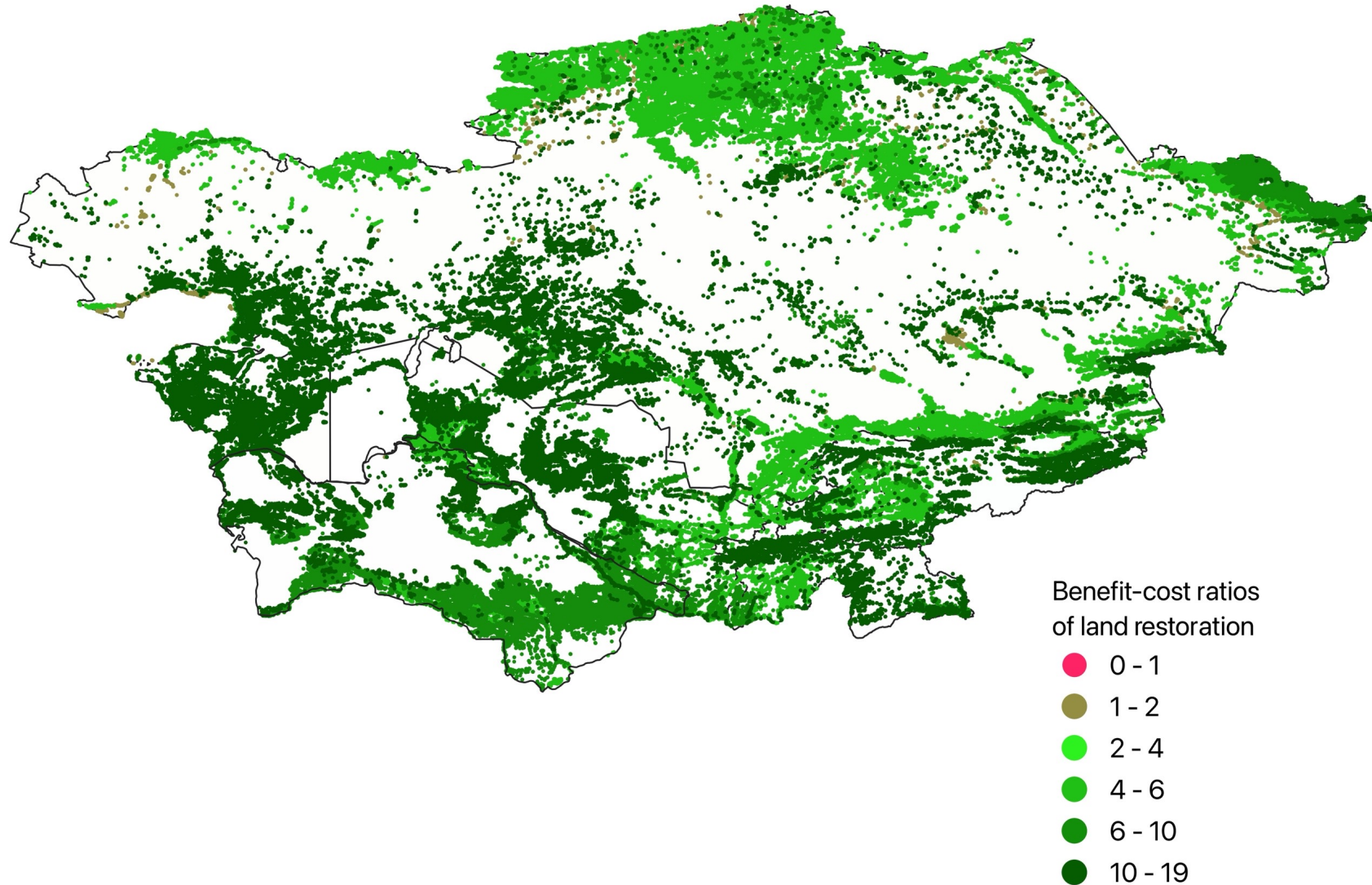
- Land restoration costs and benefits:
 - establishment costs
 - maintenance costs
 - time horizon
 - discount rate
 - period for coming into full potential
 - ecosystem values

Investment needs for land restoration 2020-2050

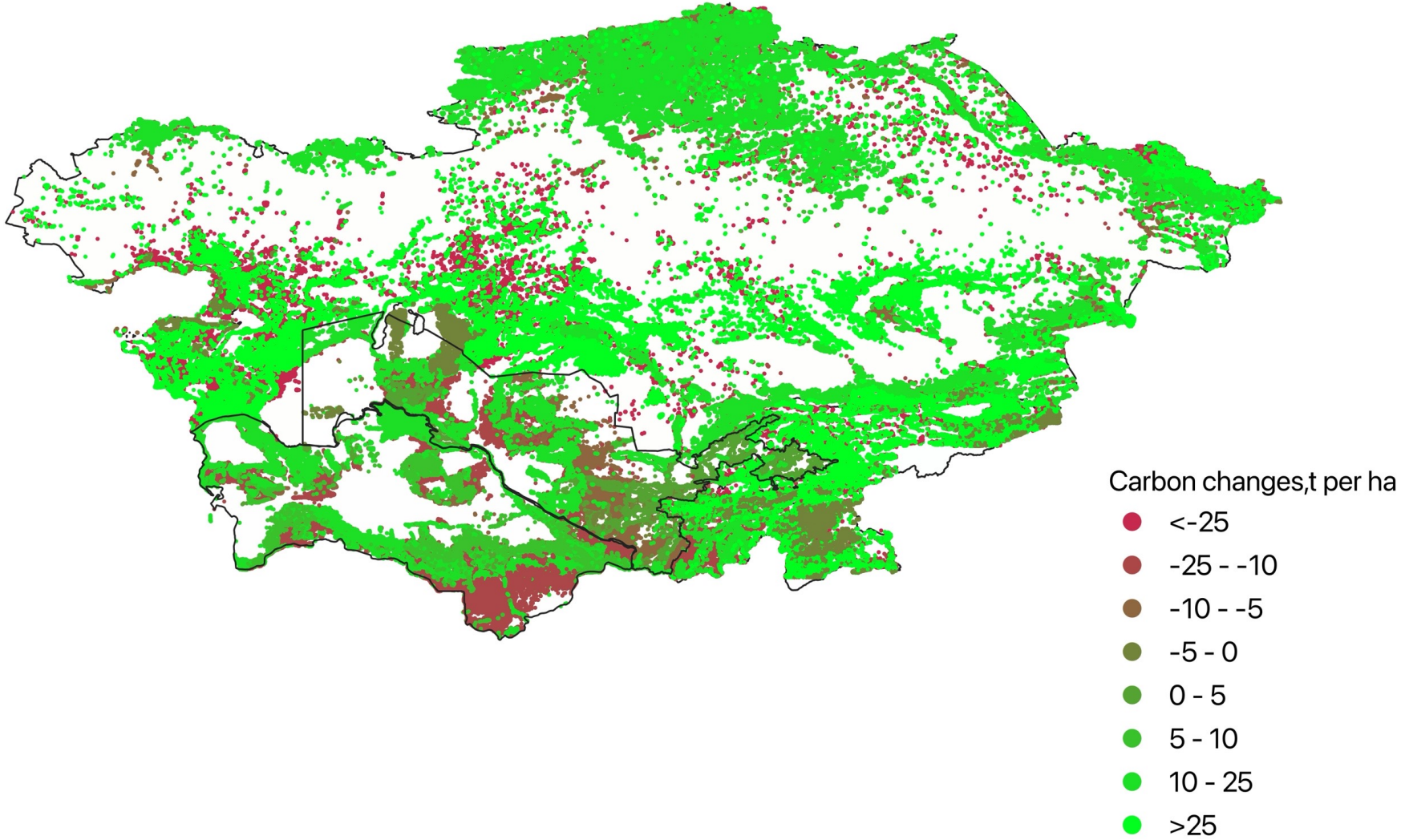
in million US dollars

Countries	Forest and shrub land restoration	Grassland restoration	Wetland restoration	Cropland restoration	Total
Kazakhstan	1564	3620	4079	25848	35111
Kyrgyzstan	28	239	93	1486	1846
Tajikistan	86	143	6	469	704
Turkmenistan	4854	1212	52	1111	7229
Uzbekistan	638	2125	67	1581	4411
Central Asia	7170	7379	4297	30495	49301

Targeting economically efficient land restoration



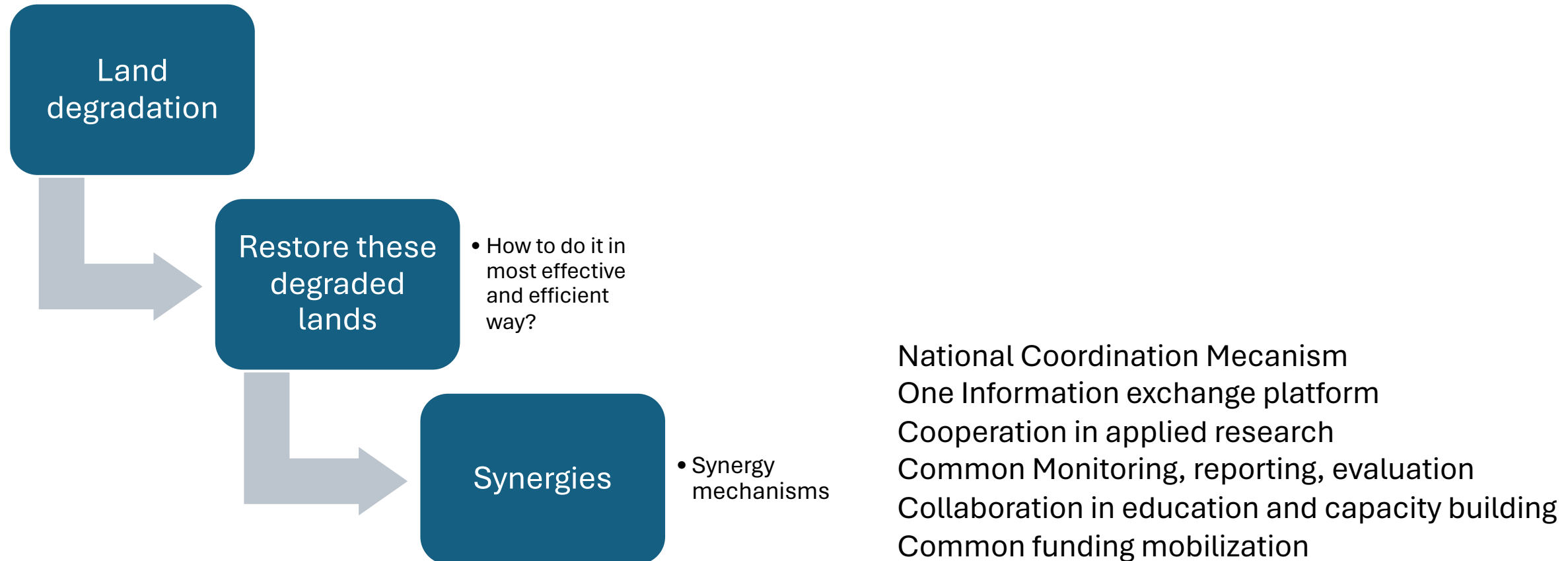
Changes in above and below ground carbon (2001-2020)



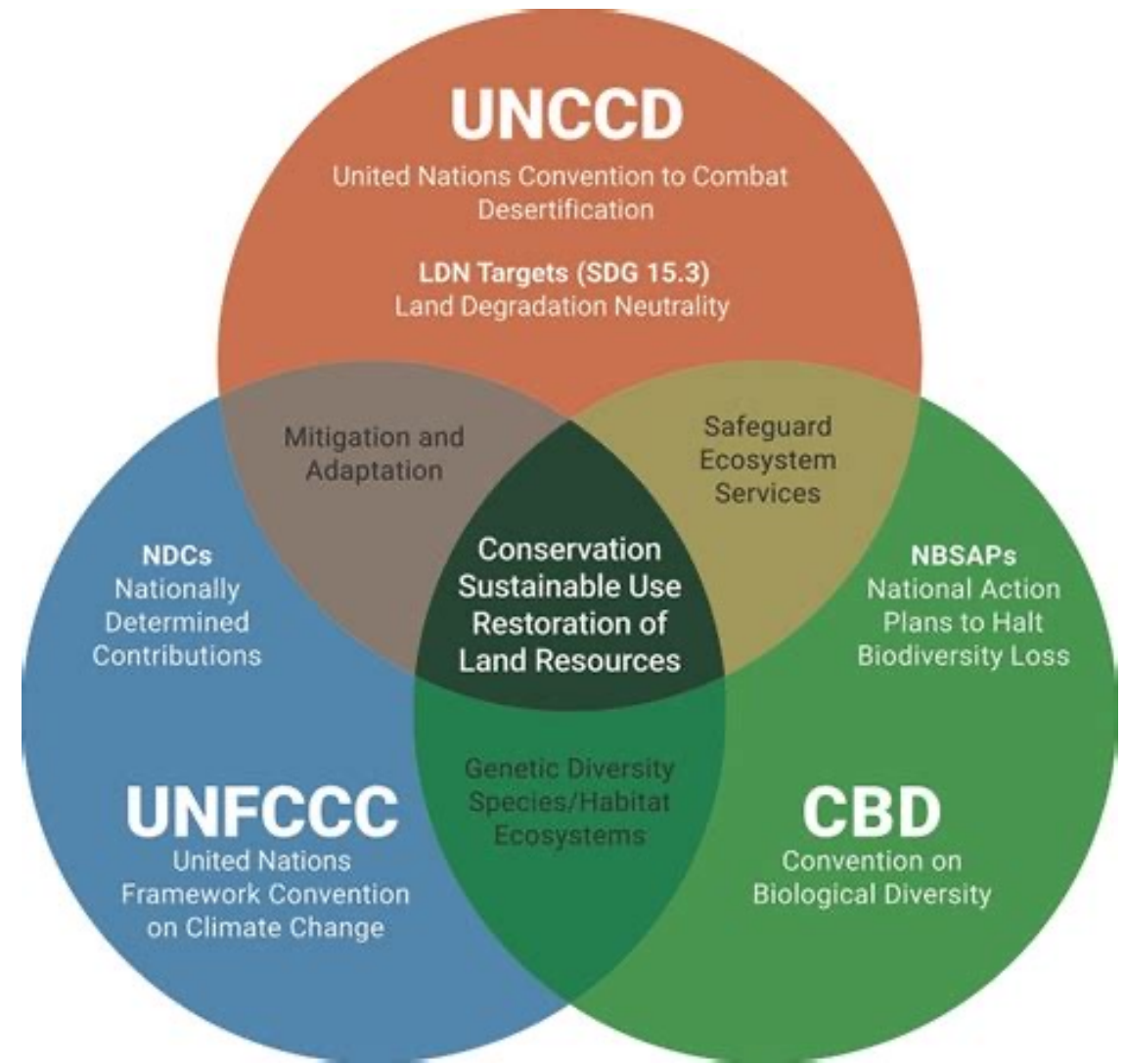
Questions for group work

- Do positive / negative changes make sense?
- What are causes in these specific locations? (human/natural)
- What can we learn about them for land restoration?
- What other type of information is useful to have in maps?

How land restoration and synergy mechanisms are connected?



- Land restoration is a multifaceted solution for land degradation, biodiversity loss, climate change, and food insecurity and malnutrition.
- Therefore, it is at the heart of CBD, UNCCD, and UNFCCC action agendas.
- There are significant synergies from joint programming and implementation of land restoration activities.



Transaction costs of land restoration

Types of restoration costs	Examples	Costs in Central Asia, (US dollars per ha)
Establishment costs	Planting of saplings, construction of terraces, etc.	300-3800
Maintenance costs	Annual recurring costs	50-200
Transaction costs	Research and information, design and implementation, funding mobilization, support and administration, contracting, monitoring and evaluation, awareness raising and education, enforcement	?

Transaction costs can be up 65% of total implementation costs.

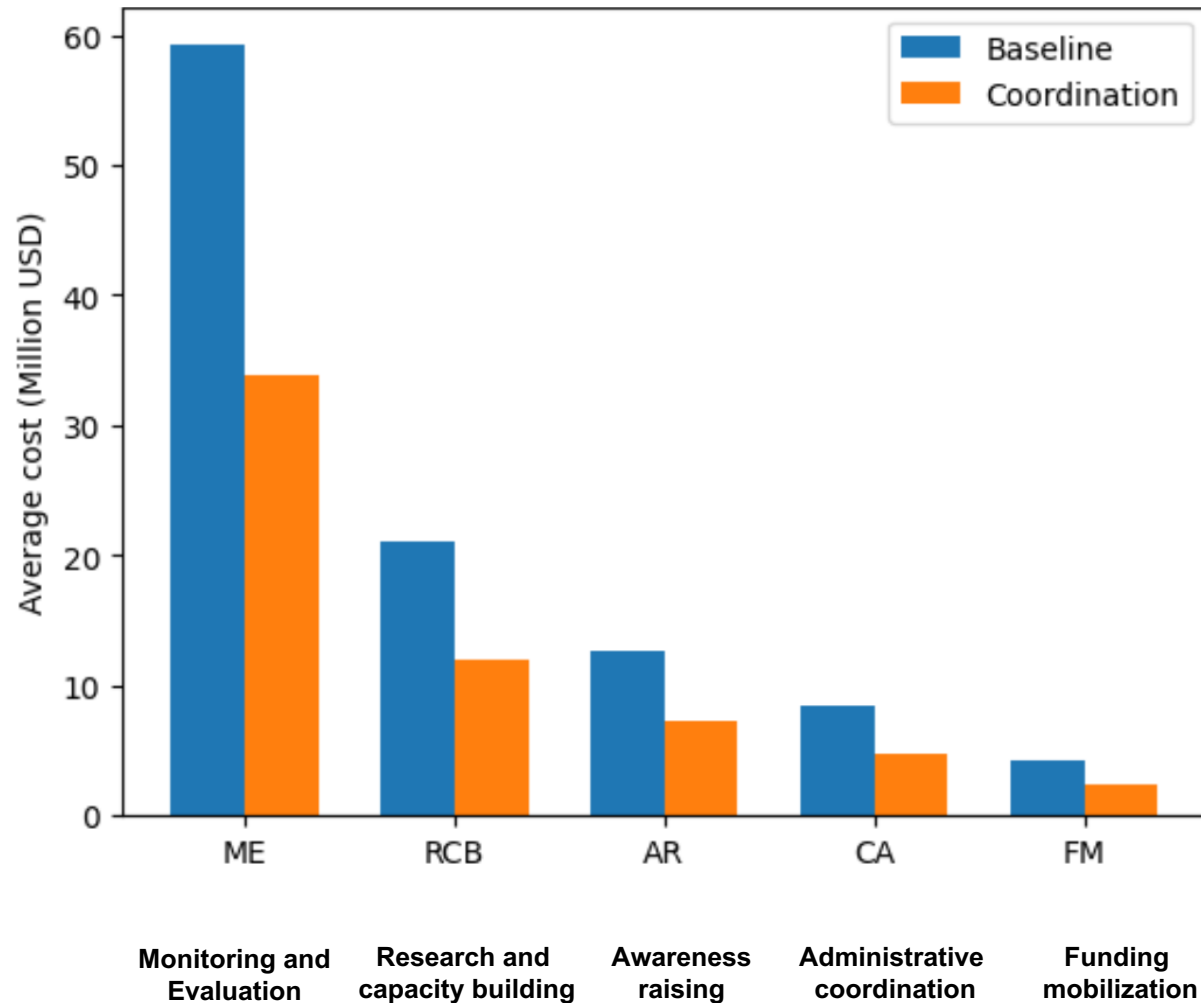
Transaction costs of land restoration in Rwanda

Types of transaction costs	Share in total costs
Coordination and administration	2%
Research and capacity building	5%
Awareness raising	3%
Funding mobilization	< 1%
Monitoring and enforcement	14%
Total share in land restoration costs	25%

Coordinated vs. separate implementation of land targets under the three Rio Conventions (in millions of US dollars) until 2030

Scenarios for synergy collaboration	Annual transaction costs when Rio Conventions' land restoration activities implemented in coordination	Annual transaction costs when Rio Conventions' land restoration activities implemented separately	Total annual gains from collaboration in Rwanda
Scenario 1. A joint inter-agency working group for land restoration, including the process for joint designing of land restoration (CA)	4.77	8.46	3.69
Scenario 2. An information exchange platform and website for land restoration, awareness raising and advocacy activities (AR)	7.19	12.69	5.5
Scenario 3. A joint monitoring and evaluation system for land restoration (ME)	33.82	59.20	25.38
Scenario 4. Joint funding mobilization for land restoration (FM)	2.41	4.23	1.82
Scenario 5. Joint research and capacity building for land restoration (RCB)	11.94	21.14	9.2
Total of all scenarios	60.13	105.72	45.59

Leveraging Synergies: Results from Rwanda



Note: averages of 10,000 modelling simulations

- Coordinated approach increases effectiveness and efficiency of implementing LDN, NBSAP, and NDC land-focused activities and reduces overall implementation costs by 15% (45 million US dollars per year) in Rwanda.
- More efficient land restoration is more attractive for public and private investments.
- Monitoring and Evaluation: area of high interest

Identified synergy mechanisms in Central Asia

- National Coordination Mechanism
- One Information exchange platform
- Cooperation in applied research
- Common monitoring, reporting, evaluation
- Collaboration in education and capacity building
- Common funding mobilization