



Food and Agriculture Organization
of the United Nations

In Situ and Ex situ gene conservation in Europe: Overview of the Region

Paul Boettcher,
Beate Scherf, Dafydd Pilling, Gregoire Leroy, Roswitha
Baumung

FAO
April 2016



IMPLEMENTING THE GLOBAL PLAN OF ACTION FOR ANIMAL GENETIC RESOURCES

The State of the World's Animal Genetic Resources for Food and Agriculture - data

- Data presented collected during preparation of the 2nd Report on the State of the World's Animal Genetic resources
- The report draws on information provided in
 - 129 country reports (including 35 from Europe and the Caucasus),
 - 15 reports from international organizations,
 - 4 reports from regional focal points and networks for animal genetic resources,
 - the Domestic Animal Diversity Information system DAD-IS, and
 - inputs from 150 individual authors and reviewers.



State of the World Country Report Questionnaires

- The first report on the State of the World's Animal Genetic Resources was based on narrative reports
 - some exceeding 200 pages
- To lessen the burden in reporting and evaluation a questionnaire was used for SoW2
- The questionnaire included a section on conservation with 8 questions
 - several in the form of tables
 - others with multiple sub-questions
- Countries were required to respond to questions about the 5 major species (cattle, sheep, goats, chickens, pigs)
 - other species were optional



Proportion of countries reporting conservation activities

Regions and subregions	Number of countries	<i>In situ</i> conservation programmes	<i>Ex situ in vivo</i> conservation programmes	<i>Ex situ in vitro</i> conservation programmes
		%		
Africa	40	70	48	30
Asia	20	90	80	65
Southwest Pacific	7	71	29	14
Europe & the Caucasus	35	100	69	86
Latin America & the Caribbean	18	83	72	61
North America	1	100	100	100
Near & Middle East	7	71	71	29
World	128	84	63	55

- 100% and 86% of European countries indicated the presence of *in situ* conservation and *ex situ, in vitro* conservation activities for at least one species, respectively (84% and 55% worldwide, respectively)
- Ex situ, in vivo* conservation programmes were less common (69%)



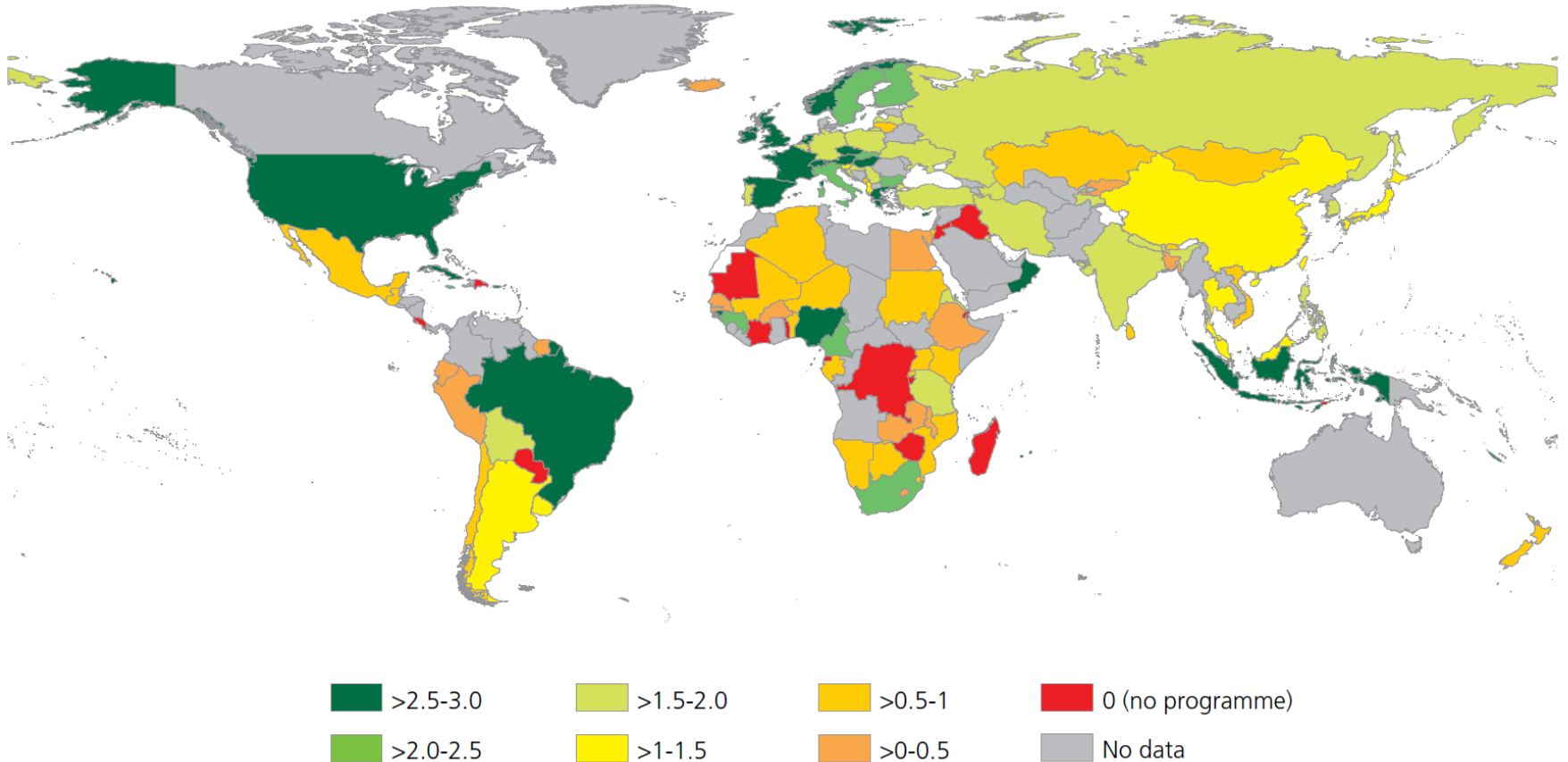
Conservation activities reported for the five major species in Europe & the Caucasus

Proportion of countries reporting conservation programmes	Dairy cattle	Beef cattle	Multipurpose cattle	Sheep	Goats	Pigs	Chickens
	%						
<i>In situ</i>	78	64	90	97	85	89	77
<i>Ex situ in vivo</i>	42	44	48	59	44	50	58
<i>Ex situ in vitro</i>	74	58	76	76	56	57	35

- Sheep is the species most frequently conserved
 - nearly all countries reported at least some programmes
- Cryoconservation rates were similar for cattle and sheep
- Chickens were the most commonly conserved species for *ex situ, in vivo*, but least common for *ex situ, in vitro*



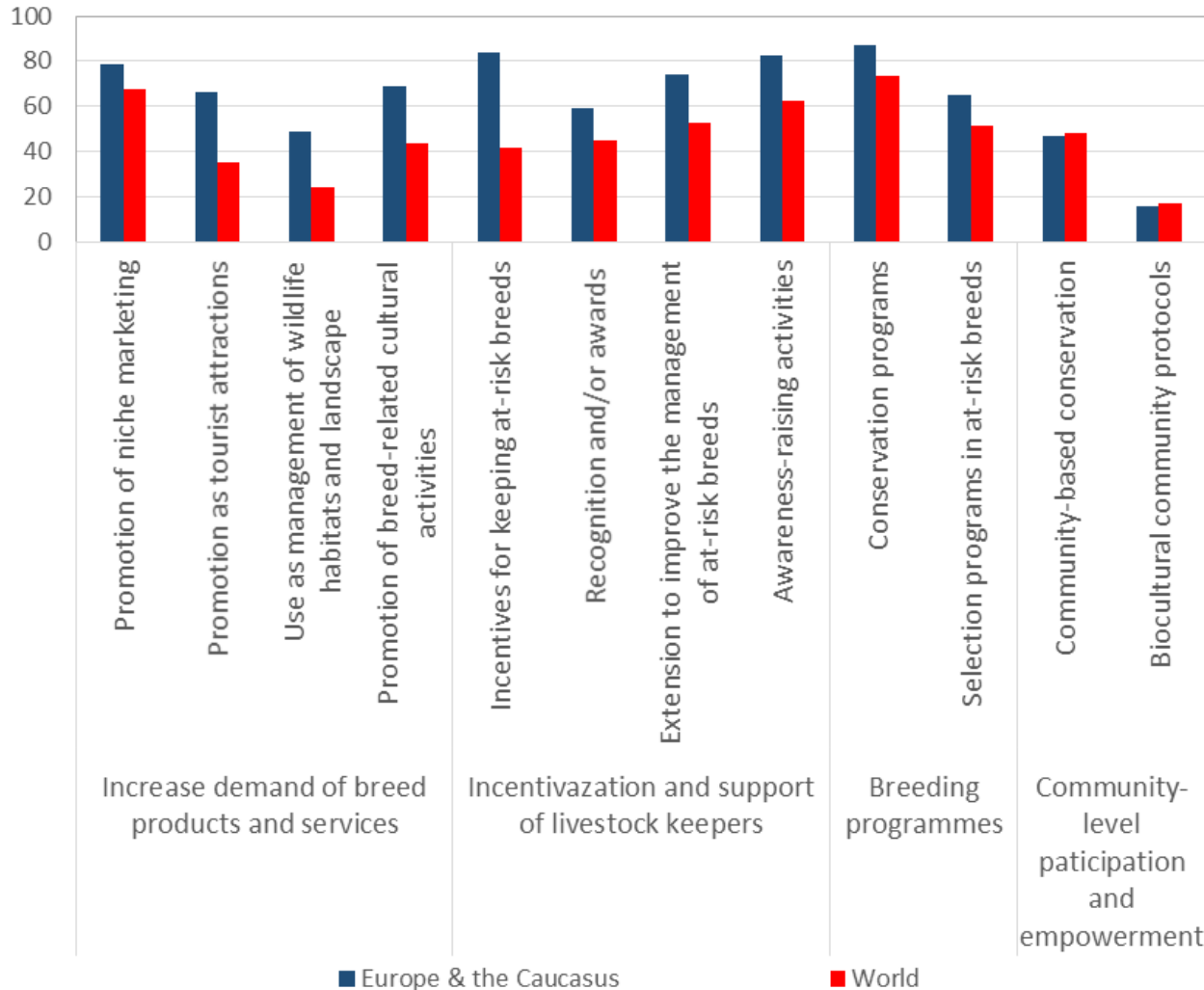
Coverage of in situ conservation programmes for the “Big Five” livestock species



Coverage indicates the reported extent to which country's breeds are covered by conservation programmes. Coverage was scored none (0), low (1), medium (2) or high (3) for each of the big five species.



Proportion of countries reporting the use of various elements of *in situ* conservation



Most tools are more commonly used in Europe than rest of the world.

Main tools reported in Europe:

- Conservation programs
- Incentives
- Awareness raising



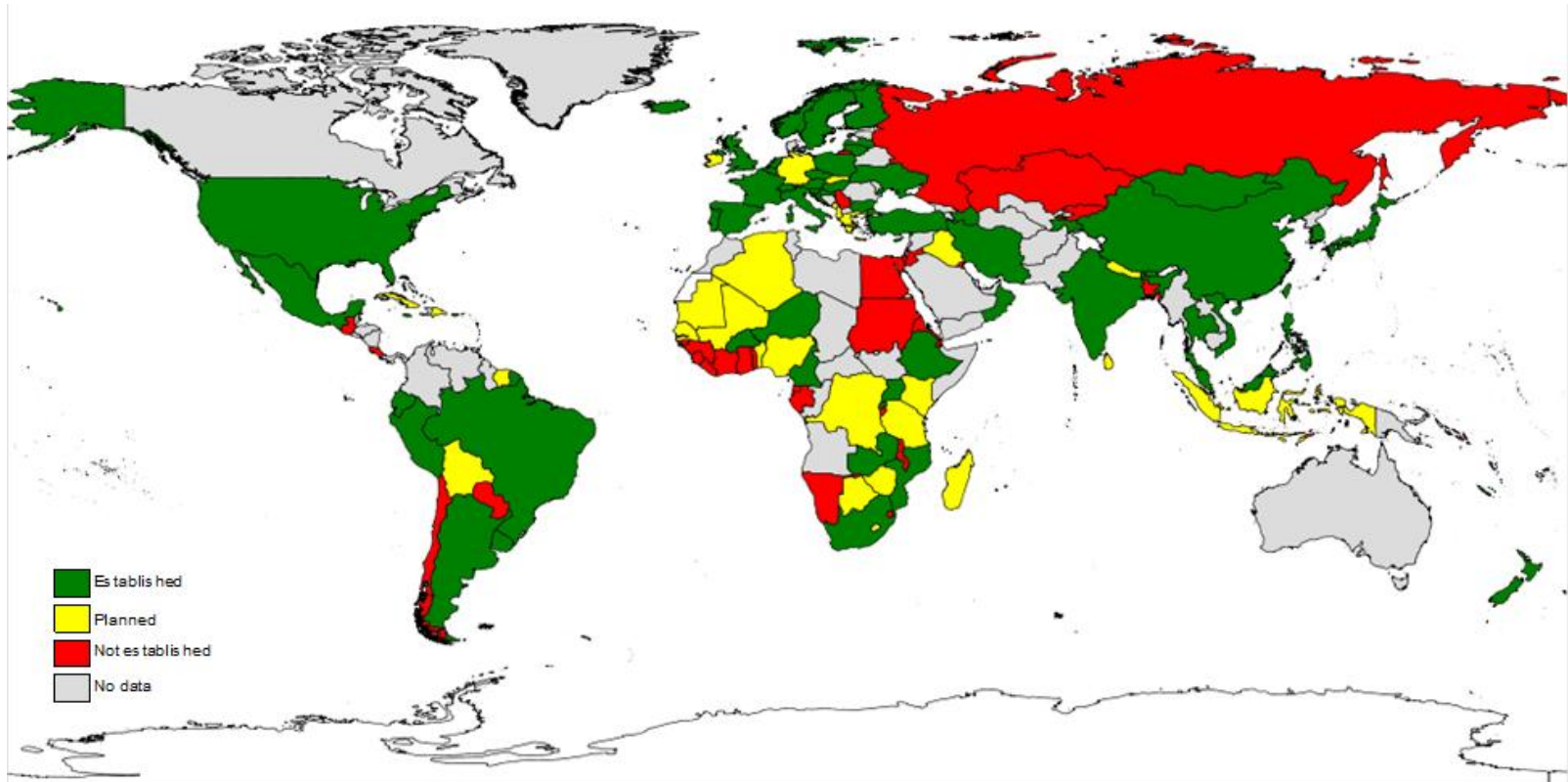
Proportion of countries reporting the presence of *in vitro* gene banks and material stored

Regions and subregions	Number of countries	Countries reporting AnGR gene bank	Proportion of countries storing different types of genetic materials in their gene banks					Countries planning subregional or regional collaboration
			Semen	Embryos	Oocytes	Somatic cells	Isolated DNA	
			(%)					
Africa	40	23	100	44	11	11	22	33
Asia	20	60	100	67	42	42	67	30
Southwest Pacific	7	14	100	100	0	0	0	14
Europe & the Caucasus	35	71	100	64	16	48	60	46
Latin America & the Caribbean	18	44	88	75	25	38	38	11
North America	1	100	100	100	100	100	100	0
Near & Middle East	7	14	100	0	0	0	100	14
World	128	45	98	63	23	39	53	30

- 71% of reporting European countries report having a national gene bank (vs 45% worldwide)
- Europe shows the highest rate of planned collaboration
- Semen is the most commonly stored material world-wide
 - embryos second



State of development of *in vitro* gene banks for animal genetic resources



Breed coverage of big five species in gene banks

Region and subregions	Reported proportion of national breed populations conserved in AnGR gene banks					
		Cattle	Sheep	Goats	Pigs	Chickens
		%				
Africa	Conserved	12	6	5	3	2
	Enough material	8	6	4	3	2
Asia	Conserved	32	24	24	19	19
	Enough material	15	9	11	10	8
Southwest Pacific	Conserved	0	0	0	0	0
	Enough material	0	0	0	0	0
Europe & the Caucasus	Conserved	40	27	28	27	5
	Enough material	23	10	12	12	3
Latin America & the Caribbean	Conserved	15	15	15	5	0
	Enough material	12	10	7	5	0
North America	Conserved	74	67	88	92	25
	Enough material	33	12	13	42	3
Near & Middle East	Conserved	4	0	0	0	0
	Enough material	4	0	0	0	0
World	Conserved	27	23	20	18	6
	Enough material	16	9	9	9	3



Species coverage in gene banks

- Coverage by species in Europe

- Chicken 5%
- Pigs 27%
- Goats 28%
- Sheep 27%
- Cattle 40%

- Sufficiency of coverage

- Chicken 3%
- Pigs 12%
- Goats 12%
- Sheep 10%
- Cattle 23%

Proposed target for Sustainable Development Goal 2 addresses the number of breeds with sufficient stored material for reconstitution



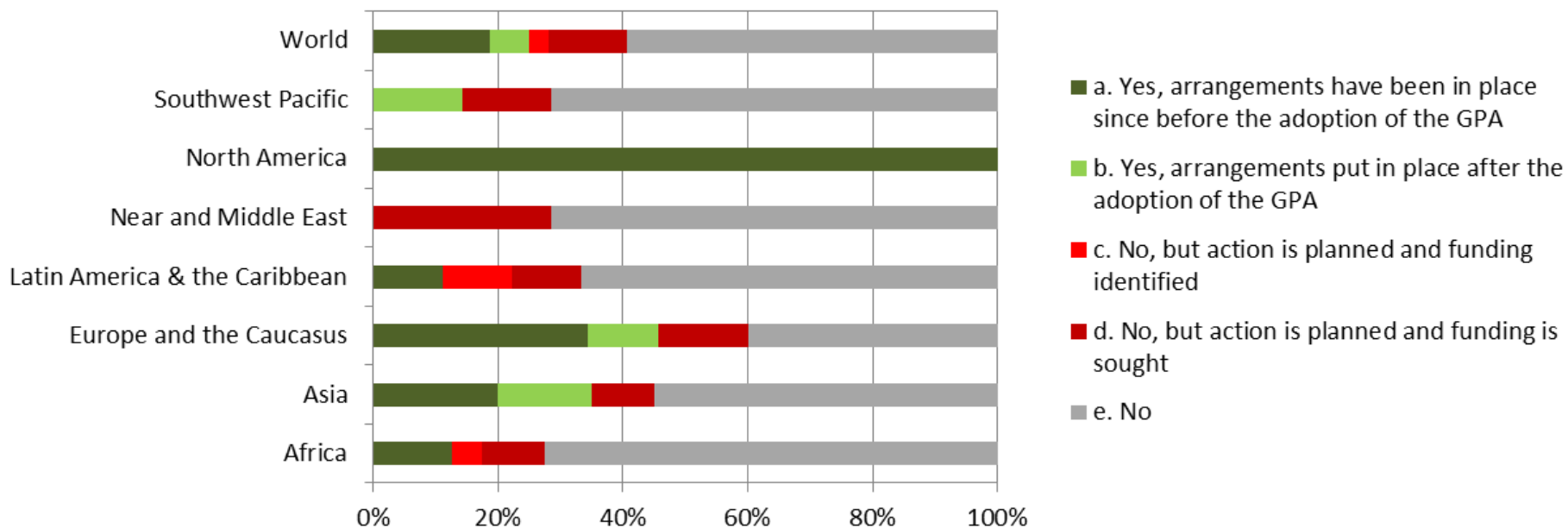
Characteristics and functions of national gene banks

Regions and subregions	Number of countries	Participation of				
		Storage of not-at-risk breeds	livestock keepers/ breeder's association	Increase genetic variability in <i>ex situ</i> population	Increase genetic variability in <i>in situ</i> population	Reconstitution of extinct breeds
(%)						
Africa	9	35	30	31	33	4
Asia	12	67	26	35	29	4
Southwest Pacific	1	0	0	0	0	0
Europe & the Caucasus	25	58	61	10	24	1
Latin America & the Caribbean	8	40	27	2	19	0
North America	1	100	100	83	67	17
Near & Middle East	1	17	0	0	17	0
World	57	53	42	18	26	2

- Many countries banks material from breeds that are not currently at risk
- Participation of livestock keepers is common
- Material has rarely been needed to reconstitute breeds



Arrangements for extraction and use of conserved genetic material following loss of animal genetic resources



- 46% of reporting countries have arrangements in place for the extraction and use of conserved genetic material following loss of animal genetic resources through events such as disasters
 - vs 25% worldwide



Summary and Conclusions

- Conservation activities have become more widespread over the last ten years.
- All the 35 countries reported existence of *in situ* conservation activities
- Many breeds remain untargeted or inadequately covered by conservation programmes
- An increasing number of countries have set up livestock gene banks, however 30% of countries remain uncovered.





Food and Agriculture Organization
of the United Nations

Thank you for your attention

More information:

www.fao.org/ag/angr.html

http://www.fao.org/ag/againfo/programmes/en/genetics/Second_state.html



IMPLEMENTING THE GLOBAL PLAN OF ACTION FOR ANIMAL GENETIC RESOURCES