European Crop Wild Relative Diversity Assessment and Conservation Forum

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Global Strategy for *Crop Wild Relative* Conservation and Use

DRAFT Version 3

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INTRODUCTION

The global and local importance of crop wild relatives

Crop wild relatives (CWR) may be defined as wild species that are more or less closely related to our food and fodder crops, and by extension forestry species, ornamental and industrial crops and other species of socio-economic importance (such as medicinal and aromatic plants) and to which they may contribute genetic material. Their relationship to crops may be defined in terms of membership of the primary or secondary gene pools, or level of taxonomic affinity (Maxted *et al.*, in press). Generally speaking, they contain the progenitors of our present day crops; after domestication starting some 10,000 years ago, wild relatives were utilized to contribute genetic traits to enable crops to adapt to their environment; these same species continue to contribute to modern varieties today. Their genetic diversity may be used to improve them or develop the new or improved varieties that are constantly needed to allow crops to grow successfully in a range of conditions and meet evolving consumer demands. CWR occur in a wide range of habitats across the world but are particularly concentrated in those areas where crops originated or subsequently diversified, known as Vavilov Centres, e.g. the Mediterranean Region, the Near East, Southern Mexico and Central America.

The value of CWR has long been recognised: they are of major importance for agriculture and forestry, which has benefited for millennia from the genes derived from them in conferring, for example, resistance to pests and diseases in major crops such as wheat, maize, rice, potato, cassava, grain legumes such as *Cicer*, *Lathyrus*, *Lens*, *Phaseolus* and *Vicia*. For example, resistance to grassy stunt virus in rice was obtained from a single accession of *Oryza nivara*, Indian Wild rice, which grows from India and Bangladesh to Cambodia, China, Malaysia and Vietnam, leading to the production of new resistant varieties (Khush *et al.*, 1997). Other improvements obtained through genetic transfer from wild relatives include drought and salt tolerance, early ripening and increased nutritional values such as protein and vitamin content. As noted by Bioversity International, 'the genes that come from crop wild relatives make a direct contribution to increased production, food quality and human wellbeing through poverty alleviation', thus contributing to the attainment of the Millennium Development Goals. The economic returns from investment in CWR can be striking; for example, genetic material from a tomato wild relative has allowed plant breeders to boost the level of solids in commercial varieties by 2.4 per cent, which is worth $250 million annually to processors in California alone (Poysa, 1993).

Older, more genetically heterogeneous crop cultivars which often contain diverse forms of resistance to pests, disease and abiotic stress are being increasingly replaced by modern advanced more genetically uniform cultivars in which such diversity of traits have been lost. The loss of older cultivars and farmers' landraces has been dramatic in many plant groups and continues to the present day, reinforcing the need for access to wild relatives with the appropriate genetic characteristics for the development of new resistant cultivars. In addition, advanced cultivars may become less effective over time and are often of short duration, needing to be replaced at regular intervals. For example, in Australia, cultivars of canola (*Brassica napus*) with resistance to the fungal disease blackleg (*Leptosphaeria maculans*) are continually being replaced by different cultivars, with few modern cultivars being used for longer than 5 years (Li *et al.*, 2006).

The demand for new cultivars remains high and will continue to be met by obtaining novel genes from wild relatives. The dependence of modern agriculture on relatively few advanced cultivars carries considerable risks: while these cultivars may be more productive in most environments than traditional cultivars, growing a narrower range of cultivars with a narrow genetic basis over larger areas can increase the vulnerability of production systems to changes in climate, land use and disturbance regime, and exposure to biotic stresses including new races of pathogens. Traditional agricultural systems with numerous, genetically diverse landraces are often better able to meet the demands of the changing environment and agro-biotic conditions. Therefore, in an age of genetically uniform monocultures it is essential that the link to CWR diversity is maintained so as to fuel the innovation of contemporary plant breeding.

Another increasingly important dimension affecting world agriculture is the effects of changes which are a result of human activities and changes in the human-nature relationship, which can be collectively referred to as Global Change. These will undoubtedly lead to an increased demand for the development of new cultivars adapted to these changing conditions, such as raised temperature and lower rainfall levels, and changed agro-environments. Increasingly, CWR will be looked to as a source of the genetic material for breeding these new adapted cultivars.

Because of their vital role in maintaining and enhancing agricultural production and productivity and in increasing food security and ensuring poverty alleviation, it is important that the necessary steps be taken to ensure the conservation of CWR as a vital source of new genetic material. Failure to take action now could have disastrous consequences for the future of agriculture and forestry.

Current situation

The first essential step for the conservation and sustainable use of CWR is to know what they are; yet most countries do not have an inventory of their CWR and without this knowledge, effective action is not possible. At regional level, only Europe and the Mediterranean thus far have a preliminary catalogue (www.pgrforum.org), although work in other regions is being developed as part of the IPGRI-UNEP-GEF project on CWR. However, there is currently no global mechanism for gathering information on CWR.

We need to know not only the identity of the CWR in our country or region but also a set of base-line data about them. This will include:

- *Correct taxonomic identification* and listing of essential synonyms, notably the names under which they are listed in the Standard Floras of the countries concerned. This will require cooperation with national taxonomic institutions;
- *Ecogeographic information*, both desk studies and field data, on the location, distribution, biology, ecology, demography and genetic diversity of the species and populations concerned;
- *Conservation status*, including IUCN Red Listing, occurrence in National Red Lists and Books, and field observations, and *in situ* and *ex situ* conservation gap analysis.

Many of the habitats in which CWR occur are under threat due to loss, fragmentation and simplification of the ecosystems in which they occur, and consequent genetic erosion, but this information is often not available or widely known. Furthermore, the presence of CWR in Protected Areas of various types, and in Vavilov centres of diversity, botanical hotspots, or Important Plant Areas (IPAs) is seldom recorded, and when known, little if any information is available on their status, the number and size of populations and their representativeness in these areas. Very few are included as monitored taxa within management plans for these areas.

The representation of CWR in gene banks is very uneven and incomplete as they are often gathered incidentally and as a consequence the number, state and representativeness of the accessions in terms of genetic diversity is usually inadequate.

Despite their acknowledged importance, the number of existing networks and research projects specifically addressing CWR conservation is very limited. Examples of networks include: the IUCN Species Survival Commission Crop Wild Relative Specialist Group (CWRSG) and the European Cooperative Programme for Crop Genetic Resources Networks (ECP/GR), specifically the *In Situ* and On Farm Network, which focuses on CWR and landrace conservation in Europe. There have also been some short-term research projects with a CWR focus including: PGR Forum (European Crop Wild Relative Diversity Assessment and Conservation Forum), the GEF funded projects, 'Conservation and sustainable use of dryland agrobiodiversity in Jordan, Lebanon, Syria and Palestinian Authority' and '*In situ* conservation of crop wild relatives through enhanced information management and field application'. However, the recent launch of the CWRSG will, it is hoped, encourage a more strategic approach to CWR conservation, and through conservation a link to enhanced utilization.

THE STRATEGY

Summary

It is recommended that CWR should be given a higher profile in the work programme of the CBD and the FAO Global Plan of Action such that information on CWR should be included in the national reporting system (including the Global Strategy for Plant Conservation and the 2010 Biodiversity Targets). Greater emphasis should be placed on CWR in the revision of the FAO State of the World's Plant Genetic Resources for Food and Agriculture report and in the International Treaty for Plant Genetic Resources for Food and Agriculture (ITPGRFA) and other legislative and policy instruments. Actions for the conservation, management and sustainable use of CWR should be incorporated as a matter of routine into national biodiversity conservation planning. Actions should be taken to promote governmental, public and professional awareness of CWR to ensure convention/treaty obligations are met.

Goal

Effective conservation and sustainable use of crop wild relatives, including all wild plant species of socio-economic value, at national, regional and global levels.

Objectives

1. Prepare national CWR strategic action plans
2. Prepare national CWR inventories
3. Establish a global mechanism / clearing house for CWR conservation and use
4. Create national priority CWR lists and identify priority CWR sites
5. Create regional and global CWR priority lists and identify priority CWR sites
6. Establish protocols for CWR information management and dissemination and provide national and global CWR information management systems
7. Develop effective means of conserving and using CWR *in situ*
8. Develop effective means of conserving and using CWR *ex situ*
9. Assess CWR conservation and threat status
10. Ensure effective security and legislation for CWR
11. Promote sustainable utilization of CWR
12. Initiate education and public awareness programmes on the importance of CWR

Targets

To achieve effective conservation and sustainable use of CWR, it is proposed that time-bound, quantitative, measurable targets be agreed for the year 2010 in harmony with the Millennium Development Goals and the CBD's aim of reducing the rate of biodiversity loss by 2010, and the relevant targets in the CBD Global Strategy for Plant Conservation (GSPC). In addition, as 2010 is too short a time-scale for many of the targets to be proposed, a date of 2015 is suggested for these. These targets are presented in the detailed implementation plan for the Strategy shown below.

IMPLEMENTATION OF THE STRATEGY

For each target, the lead organisation(s), contributing organisation(s), time frame and references to assist implementation of targets should be provided. The compilers request that reviewers provide suggestions for completion of information where there are currently gaps. Please also provide comments on any part of the current draft Strategy. Notes are those resulting from group discussions on Draft Version 1 or added by the compilers.

Objective 1: Prepare national CWR strategic action plans
Each country to prepare a national action plan for the inventory, survey, conservation (*in situ* and *ex situ*) and sustainable use of CWR by 2010

Targets	Lead organisation(s)	Contributing organisation(s)	Time frame	References	Notes
a. Each country to develop a National Strategic Action Plan (NSAP) for CWR conservation and use	National PGR (Biodiversity) coordinator	Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs	2008	[1]	
b. Review existing biodiversity strategies and action plans in relation to CWR conservation and use	National PGR Committee, Ministry of Agriculture	Ministry of Environment/Nature Protection; Forestry; Research institutes; NGOs	2007	[2]	
c. NSAP for CWR conservation and use to be fully integrated into and complement existing national and regional biodiversity strategies and action plans	National PGR (Biodiversity) coordinator	Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs	2008	[3]	
d. Define responsibilities for preparation and implementation of NSAP	National PGR Committee, Ministry of Agriculture	Ministry of Environment/Nature Protection; Research institutes; NGOs	2007		

[1] European Plant Conservation Strategy: http://www.nerium.net/plantaeuropa/DownloadArea.htm

[2]
- National and Regional Biodiversity Strategies and Action Plans: http://www.biodiv.org/world/nbsaps.asp; http://www.undp.org/bpsp/nbsap_links/nbsap_links.htm
- National Action Plan for Sustainable Development
- Strategy and Action Plan for Conservation of Biodiversity
- Sectorial Action Plans

[3] National and Regional Biodiversity Strategies and Action Plans: http://www.biodiv.org/world/nbsaps.asp; http://www.undp.org/bpsp/nbsap_links/nbsap_links.htm
Pan European Biological and Landscape Diversity Strategy: http://www.strategyguide.org/fulltext.html

e. Designate a National Focal Point for CWRs	National PGR Coordinator	FAO, IPGRI, IUCN CWRSG	2007		
f. Select political or social targets associated with CWR conservation e.g. increase of awareness	National PGR Committee	FAO, IPGRI, IUCN CWRSG	2008		

Objective 2: Prepare national CWR inventories Each country to: a) Prepare an inventory of the CWR growing in its territory by 2015 b) Explore the possibility of cooperating with neighbouring countries in the production of regional catalogues by 2010					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
a. Produce checklist of CWR	National PGR Committee	Herbaria and other botanical institutes	2008	[4], [5]	
b. Identify data sources e.g. GIS and climate data	National PGR Committee	Research institutes; nature protection organizations, IPGRI, IUCN CWRSG	2007		
c. Collate and manage information	National PGR Committee	IPGRI, IUCN CWRSG	2010		

[4] Checklists of vascular plants
[5] Methodology for creating a national CWR inventory - Maxted *et al.*, in prep.

Objective 3: Establish a global mechanism/clearing house FAO, CGIAR/IPGRI, IUCN and other relevant bodies, in cooperation with parties to the CBD, to put in place a global mechanism/clearing house for CWR conservation and use by 2010					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
a. Report CWR diversity to FAO as part of Global Plan of Action for the Conservation and Sustainable Utilization of PGRFA commitments	National PGR Committee	FAO	2008	[6]	
b. Establish global mechanism for CWR information	FAO Commission on PGRFA, IPGRI	IUCN/SSC CWRSG	2010		

[6] http://www.fao.org/WAICENT/FaoInfo/Agricult/AGP/AGPS/GpaEN/gpatoc.htm

Objective 4: Create national priority CWR lists and identify priority CWR sites Each country to prepare a national priority list of CWR in need of urgent conservation action using existing priority-determining criteria by 2015					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
a. Develop national priority CWR lists	National PGR (Biodiversity) / CWR coordinator(s)	Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs, IUCN/SSC CWRSG	2010		[7]
b. Develop conservation action plans for priority taxa	National CWR coordinator	Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs, IUCN/SSC CWRSG	2010		
c. Develop individual solutions to national priorities	National PGR (Biodiversity) / CWR coordinator(s)	Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs, IUCN/SSC CWRSG	2010		
d. Identify within each country, 5 priority sites for the establishment of active CWR genetic reserves. These reserves should form an interrelated network of internationally, regionally and nationally important CWR genetic reserve sites for *in situ* conservation	National PGR (Biodiversity) / CWR coordinator(s)	Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs, IUCN/SSC CWRSG	2010		

[7] National priority lists to be harmonized with regional priority lists where possible and appropriate

Objective 5: Create regional and global CWR priority lists and identify priority CWR sites FAO, IPGRI, the CBD and other relevant bodies, in cooperation with parties to the CBD, to put in place a system for preparing regional and global CWR priority lists by 2015 [8]					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
a. Develop regional and global priority CWR lists	IPGRI, FAO, BGCI, IUCN/SSC CWRSG	National PGR (Biodiversity) coordinators, Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs,	2008	[9]	[10]
b. Develop conservation action plans for priority taxa	IPGRI, FAO, BGCI, IUCN/SSC CWRSG	National PGR (Biodiversity) coordinators, Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs,	2010		
c. Develop individual solutions to certain regional and global priorities	IPGRI, FAO, BGCI, IUCN/SSC CWRSG	National PGR (Biodiversity) coordinators, Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs,	2010		
d. Identify globally, and within each region, a small number of priority sites (global = 100, regional = 25) for the establishment of active CWR genetic reserves. These reserves should form an interrelated network of internationally, regionally and nationally important CWR genetic reserve sites for *in situ* conservation	IPGRI, FAO, BGCI, IUCN/SSC CWRSG	National PGR (Biodiversity) coordinators, Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs,	2010		

[8] In some cases, biogeographic units or agroecological units may be appropriate, as opposed to political units. May also be territories rather than states or in some cases semi-autonomous divisions of countries.

[9] Ford-Lloyd *et al.*, in press.

[10]

- Prioritize on the basis of the number of countries a taxon occurs in within a region e.g. a taxon endemic to one country has priority over a taxon that occurs in 4 countries
- Rank on the basis of socio-economic criteria
- Refine prioritized list with regard to the 50 genera listed on the ITPGRFA, taxa listed on the CITES appendices, and other relevant global and regional legislative instruments e.g. EU Habitats Directive (Annex 5)
- Refine prioritized list with regard to red listing, genetic factors, screening for major errors, major requirements outside the region

Objective 6: Establish protocols for CWR information management and dissemination and provide national and global CWR information management systems Existing information management systems for CWR to be harmonised and applied by national, regional and global organizations by 2015					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
a. Integrate CWRIS into EURISCO	IPGRI on behalf of the ECP/GR	ECP/GR *In Situ* and Documentation Networks	2008	[11], [12]	[13]
b. Agree data standards and mechanism for collation of National CWR Inventory (NI) data	IPGRI/National PGR Committees	GEF CWR Project, ECP/GR *In Situ* and Documentation Networks	2008		
c. Harmonise CWRIS / EURISCO with the international GEF CWR project	IPGRI/FAO	ECP/GR *In Situ* and Documentation Networks	2009	[14]	
d. Improve data entry tools like GRIS	IPGRI/FAO	ECP/GR Documentation Network	2009		[15]

[11] CWRIS: PGR Forum Crop Wild Relative Information System (http://cwris.ecpgr.org)
[12] EURISCO: European Internet Search Catalogue of *Ex Situ* PGR Accessions (http://eurisco.ecpgr.org/)
[13] Applicable in Europe only, but can be expanded to other regions using appropriate information networks and management systems available
[14] GEF CWR Project: *In Situ* Conservation of Crop Wild Relatives through Enhanced Information Management and Field Application
[15] GRIS: Genetic Resources Information System

Objective 7: Develop effective means of conserving and using CWR *in situ*					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
a. Establish the international, regional and national active genetic reserves identified under Objective 5, Target d	National PGR (Biodiversity) coordinators working with regional and international conservation agencies	Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs, IUCN/SSC CWRSG	2015	[16], [17], [18]	
b. National action to be taken to record the presence of CWR in each country's protected areas system	Whoever is responsible for national protected areas	Ministries of Environment/Nature Protection and Forestry, NGOs	2010		
c. Each country to assess whether the existing network of protected areas adequately represents the full range of national CWR diversity, and suggest additional reserve locations where required	National PGR (Biodiversity) coordinator	Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs	2010		
d. Link CWR *in situ* reserve sites with other current initiatives, such as the Important Plant Area initiative and Natura 2000 network, and where appropriate establish genetic reserves linked to these initiatives	National PGR (Biodiversity) coordinator	Ministries of Agriculture, Environment/Nature Protection and Forestry, Plantlife International, European Topic Centre on Biodiversity, NGOs, IUCN/SSC CWRSG	2010	[19], [20]	
e. Encourage UNESCO MAB to complete its floristic inventories in MAB Reserves and highlight which CWR are known to occur in each	National MAB Committees	Ministries of Environment/Nature Protection and Forestry, NGOs, IUCN/SSC CWRSG	2010	[21]	

[16] Israeli Journal of Botany (Vol. 40, Nos. 5–6, 1991)
[17] Zencirci *et al.* (1998)
[18] Maxted *et al*. (in press)
[19] IPAs: Important Plant Areas (http://www.plantlife.org.uk/international/plantlife-ipas.html)
[20] Natura 2000 network: http://europa.eu.int/comm/environment/nature/home.htm
[21] UNESCO MAB: http://www.unesco.org/mab/index.shtml

Objective 7: Develop effective means of conserving and using CWR *in situ* cont'd					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
f. Raise awareness among Protected Area Managers of importance of CWR and request they take into account the maintenance and conservation needs of CWR when drawing up or revising management plans	Protected area managers	Ministries of Environment and Forestry, NGOs, IUCN/SSC CWRSG	2010		
g. Involve local communities in planning community conservation of CWR and encourage them to participate in the management of reserves and other protected or non-protected areas in which CWR are known to occur	Protected area managers	Ministries of Agriculture, Environment/Nature Protection and Forestry, NGOs	2010		
h. Examine the potential role of micro-reserves in CWR conservation	National PGR (Biodiversity) coordinator	University research	2010		
i. Countries and agencies to review the possibilities of conservation of CWR outside protected areas, including agro-ecosystems	NGOs and other grassroots organizations	University research	2010		
j. Countries and agencies to review possibilities for conservation of CWR outside protected areas via policy decisions (easements, set-aside, and other appropriate mechanisms)	European Commission and national ministries	European Commission, Ministries of Agriculture, Environment/Nature Protection and Forestry	2010		
k. Promote traditional farming systems for both landrace and CWR conservation	European Commission and national ministries	European Commission, Ministries of Agriculture, Environment/Nature Protection and Forestry	2010		

Objective 7: Develop effective means of conserving and using CWR *in situ* (continued)					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
l. Establish protocols for the management and monitoring of genetic diversity in CWR populations	IUCN/SSC CWRSG, ECP/GR *In Situ* Task Force	University research	2007	[22]	
m. Publish case studies for the complete genetic reserve location, establishment and routine maintenance process to act as templates for subsequent projects	IPGRI	GEF projects, IUCN / SSC CWRSG	2010		
n. Publish protocols and examples of the integration of CWR *in situ* conservation and use as a means of promoting CWR use	FAO / IPGRI	Regional or global networks, breeding programmes	2010		

[22] Iriondo *et al*. (in prep.).

Objective 8: Develop effective means of conserving and using CWR *ex situ*					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
a. Undertake gap analysis of CWR representation in national, regional and global gene banks, field gene banks (clonal collections)	National gene banks or networks	FAO, IPGRI, CG Centres, regional or global networks	2010		
b. Systematic collection of CWR diversity identified as being under-represented in national, regional and global gene banks, including field gene banks (clonal collections)	National gene banks or networks	FAO, IPGRI, CG Centres, regional or global networks	2015	[23]	
c. In cooperation with IABG, BGCI and regional and national botanic garden networks, review the presence and status of CWR accessions in botanic gardens, universities and other holders of *ex situ* living collections	Gene bank and botanic garden managers	BGCI, FAO, IPGRI, regional or global networks	2010	[24], [25]	[26], [27]
d. Establish community seed banks for wild harvested CWR and those with immediate use	National gene banks	FAO, IPGRI, regional or global networks	2010		
e. Publish protocols and examples of the integration of CWR *ex situ* conservation and use as a means of promoting CWR use	BGCI, FAO and IPGRI	Regional or global networks, breeding programmes	2010		

[23] Parra-Quijano *et al.*, in press
[24] Wyse Jackson *et al*., 2001
[25] Heywood, 1999
[26] IABG: International Association of Botanic Gardens (http://www.bgci.org/botanic_gardens/iabg/)
[27] BGCI: Botanic Gardens Conservation International (http://www.bgci.org/)

Objective 9: Assess CWR conservation and threat status a) Red list all priority CWR taxa by 2015, b) Assess the likely impact of global change on CWR diversity and survival by 2015, c) Assess CWR diversity as gene sources to assist the likely impact of global change on crops, d) Establish common protocols for assessing genetic erosion of CWR, including proxy indicators, e) Establish common protocols for assessing crop to CWR gene flow and its consequences by 2010					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
a. Assume responsibility to lead global red listing of all priority CWR taxa	IUCN/SSC CWRSG	Other relevant IUCN/SSC Specialist Groups	2006		
b. Assume responsibility to lead national red listing of all priority CWR taxa	PGR National Focal Points		2006		
c. Establish functional expert committees at national level comprising all key people	PGR National Focal Points	Authors of national red lists, CBD Focal Points, Ministries of Agriculture and Environment, organizations responsible for the state of the world report on PGR	2006		
d. Include a section on progress in national red listing in national reports on the state of the world PGR	Organizations responsible for the state of the world report on PGR	National expert committees on CWR red listing	2007		
e. Undertake Red List threat assessments of national endemic CWR taxa	National expert committees on CWR red listing	Ministries of Agriculture, Environment/Nature Protection and Forestry, Plantlife International, European Topic Centre on Biodiversity, NGOs, IUCN/SSC CWRSG	2008		
f. Produce a first draft of a global Red List of priority CWR taxa based on national endemics	IUCN/SSC CWRSG	Ministries of Agriculture, Environment/Nature Protection and Forestry, Plantlife International, European Topic Centre on Biodiversity, NGOs, IUCN/SSC CWRSG	2009		
g. Produce a report based on existing documentation on global change identifying areas at greater risk and priority CWR that are more vulnerable	IUCN/SSC CWRSG	IPPC, IUCN, WWF; other relevant IUCN/SSC Specialist Groups	2006/7		

Objective 9: Assess CWR conservation and threat status cont'd					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
h. Develop and apply protocols for conservation assessment of *in situ* and *ex situ* conserved CWR diversity	IUCN/SSC CWRSG IPGRI	Ministries of Agriculture, Environment/Nature Protection and Forestry, Plantlife International, European Topic Centre on Biodiversity, NGOs, IUCN/SSC CWRSG	2007		
i. Conduct population level research on selected CWR to aid threat and conservation assessment	Research institutes	IUCN/SSC CWRSG, other relevant IUCN/SSC Specialist Groups	2015		
j. Produce systematic conservation assessment	IUCN/SSC CWRSG	IPGRI	2015		
k. Organise an international conference on protocols for assessing genetic erosion	IPGRI	IUCN/SSC CWRSG	2007		
l. Submit research project proposal on protocols for assessing genetic erosion	Research institutes	IPGRI, IUCN/SSC CWRSG	2008		
m. Organise an international conference on protocols for assessing crop to CWR gene flow and its consequences	IUCN/SSC CWRSG	IPGRI	2007		
n. Submit research project proposal on protocols for assessing crop to CWR gene flow and its consequences	Research institutes	IPGRI, IUCN/SSC CWRSG	2008		
o. Submit research project proposal on impact of climate change on longer term sustainability of CWR in genetic reserves	Research institutes	BGCI, IPGRI, IUCN/SSC CWRSG	2007		
p. Review impact of wild harvesting on CWR population sustainability	IPGRI	IUCN/SSC CWRSG	2007		

Objective 10: Ensure effective security and legislation for CWR [28]					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
a. Undertake a review of which CWR species are included in existing national, regional and global policy and legislative instruments, and afford protection to priority CWR taxa that are not already included	IUCN/SSC CWRSG	IPGRI, UNEP	2007		
b. Review the effectiveness of existing policy and legislation for the conservation and sustainable use of CWR	FAO	IPGRI	2007		
c. Undertake a review of available funding opportunities for CWR conservation	IUCN/SSC CWRSG	IPGRI, FAO	2007		
d. Encourage and promote close inter-sectoral coordination at national level with broad involvement of stakeholders	FAO	IPGRI	2008		
e. Incorporate CWR into relevant national strategies	Ministries of Agriculture, Environment/Nature Protection and Forestry	IPGRI, FAO	2010		

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- Existing global and regional policy agreements (such as GPA, CBD, ITPGRFA, GSPC) cover all plant species including CWR
- Mechanisms for communication about these agreements need to be encouraged at national and local levels
- Development and implementation of national policies through broad, participatory, 'bottom-up' approaches
- Some areas not addressed by policy and legal agreements, e.g. harvesting of CWR from the wild
- Linkages between public awareness and policy making
- Organizing a national meeting with stakeholders could be an effective means to achieve Target 10

Objective 11: Promote sustainable utilization of CWR					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
a. Promote sustainable use of CWR	IUCN/SSC CWRSG	FAO, IPGRI	2010	[29]	
b. Encourage the use of CWR in breeding programmes	IPGRI, FAO Commission on PGRFA	IUCN/SSC CWRSG	2008		[30]

[29] IUCN/SSC Sustainable Use Specialist Group for guidance and publications (http://www.iucn.org/themes/ssc/susg/)
[30] Linkages and collaboration with private companies (corporate responsibility – awareness raising – marketing opportunities)
- economic incentives/instruments to promote use

Objective 12: Initiate education and public awareness programmes on the importance of CWR [31]					
Targets	**Lead organisation(s)**	**Contributing organisation(s)**	**Time frame**	**References**	**Notes**
a. Identify a means of integrating awareness of the importance of CWR into existing education and public awareness programmes at national, regional and global levels	IUCN/SSC CWRSG, BGCI	IPGRI	2010		
b. Identify and develop public awareness campaigns through existing groups that reach wide audiences, such as NGOs, the private sector, national associations of producers, farmers, industry	PGR National Focal Points	IPGRI , IUCN/SSC CWRSG, BGCI	2010		
c. Promote awareness of the importance of CWR conservation and use for professional protected area managers, plant breeders, biotechnologists and other potential CWR stakeholders	IPGRI	IUCN/SSC CWRSG	2010		

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- Public awareness is a high priority
- Actions need to target different levels and groups of stakeholders
- Adapted to local situations
- Innovative ways of promoting public awareness
- Role of the civil society
- The CWR community needs to proactively make information known
- CWR offer a good story!
- Education needs to be promoted at all levels, including educators

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