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1. About this manual

BioTrade is a globally significant industry that can generate benefits for poor people. In many cases, however, BioTrade trade is unregulated, or managed poorly—often resulting in losses for both biodiversity conservation and for poor people's livelihoods. Unsustainable wildlife trade, for example, has caused major population declines for a number of species—in turn limiting the ability of local people to take advantage of these species for subsistence use or to derive income from them over the long term. On the other hand, well-managed BioTrade can reverse biodiversity declines. This can open up new opportunities for income generation as well as securing subsistence resources for food, health and other needs. Sustainable, well-managed BioTrade can thus contribute significantly to securing sustainable livelihoods at the local level and to delivering on the Millennium Development Goals (MDGs) at the national level.

This manual provides an introduction to the multifaceted nature of BioTrade, focusing mainly on the national and international trade of physical goods derived from biodiversity. The manual also covers issues related to the trading of access rights to genetic resources in the framework of the international regime on access and benefit-sharing.

In chapters 2 and 3, the reader is introduced to concepts such as “sustainability” and “native biodiversity” that are key to the understanding of the manual's subject. Although much used in the current debate in relation to BioTrade, these concepts are not as straightforward as their frequent use may suggest. These sections also give much consideration to agricultural sustainability that may surprise the reader less familiar with the growing importance of farming methods in replacing wild sourcing of BioTrade goods. The extent to which agricultural production relieves demand pressures on natural systems, which far exceed their capacity to replenish the resource base, is not sufficiently appreciated. Ultimately, making BioTrade fully sustainable will not only depend on the management of non-agricultural ecosystems but also on making agriculture sustainable.

Chapter 4 provides an overview on the benefits from BioTrade, the size of the market, and implications for poverty, gender, and the environment.

Chapter 5 presents international conventions relevant to BioTrade, notably the Convention on Biological Diversity (CBD), but also CITES and Ramsar.

In chapters 6 and 7, the national and international factors enabling or hindering BioTrade are explored. Many of these factors, in particular trade agreements and quality certifications, are notorious for their ambiguous nature as non-tariff barriers and at the same time as incentives for BioTrade actors to improve quality management and build trade reputation.

Each chapter is concluded with a section providing “Recommended reading”. This contains references that are mostly open-source and can be conveniently downloaded from the Internet.

2. Concepts relevant to BioTrade

2.1 Biodiversity

“Biodiversity” or “biological diversity” is the variation of life forms within a given ecosystem or the entire planet. As such it encompasses the totality of genes and species of a particular region or domain. Traditionally, three levels of biodiversity have been identified: ecosystem biodiversity, species diversity, and intra-specific diversity. Molecular diversity has been suggested as a fourth dimension in light of its usefulness for genomic analysis and fingerprinting purposes.

Box 1: The CBD definition of biodiversity. The United Nations Convention on Biological Diversity (CBD) defines "biological diversity" as "the variability among living organisms from all sources, including, 'inter alia', terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems".

Life consists of many millions of distinct biological species. There are an estimated 6-10 million insect species, of which only 1,000,000 have been described and catalogued, and some 300,000 species of flowering plants. Some species are more important for human use than others. The species richness of certain groups, such as the economically relevant orchids (20,000 species) and the palms (2000) suggest that there is much potential for humans to derive even greater benefits from the use of biodiversity than at present.

Biodiversity critically supports nutrition in terms of the biodiversity products that constitute food. The reservoir of genetic traits present in crop wild relatives and landraces is fundamental in maintaining and improving crop performance through plant breeding, an ongoing process of vital importance for humans, but little appreciated. Biodiversity is also critically associated with health. Drug discovery and manufacture relies to a large extent on plant diversity. Not least important, biodiversity has intrinsic aesthetic and cultural values that discredit the notion that tropical forests and other ecosystems are only worthy of conservation because of the tangible services they provide.

Yet, this is a time in human history of unprecedented and unabated decline of biodiversity, because of over-use, the destruction of habitats, the failure to recognize the option value of biodiversity, and –in the wake of globalization- the abandonment of traditional lifestyles with their greater reliance on biodiversity.

Biodiversity is much richer in the tropics than in the temperate zone, while the inverse is true for the distribution of wealth and purchasing power, thus determining the direction of international BioTrade along a south-north gradient.

Box 2: Agricultural biodiversity: In regard of BioTrade, agricultural biodiversity is especially noteworthy. The genetic resources embodied in agricultural seed and animal stocks are the most important assets of agricultural systems in delivering their principal ecosystem service, which is the provision of food and other agriculture-based commodities. As such they have overwhelming importance for human nutrition, dietary diversity, farmer income and economies.

There is also considerable diversity within most agricultural species, notably in domesticated species that have been subject to human selection pressure. For example, there are an estimated 4000 varieties of native potatoes in the Andes and several tens of thousands of rice varieties, many of which have distinct use properties and adaptations.

2.2 Sustainability

In a broad sense, sustainability is the capacity to endure¹. Ecosystems are sustainable when they maintain ecological functions, biodiversity and productivity into the future. For humans, sustainability is the potential for long-term maintenance of wellbeing, which will in turn depend on the responsible use of natural resources.

The Global Environment Outlook 4² defines sustainability as "a characteristic or state whereby the needs of the present and local population can be met without compromising the ability of

¹ The word "sustain" is derived from the Latin verb *sustinere* (to keep in existence or maintain) and implies long-term support or permanence

² UNEP (2005), p. 524-525

future generations or populations in other locations to meet their needs” thus capturing two fundamental issues: the intra-generational equity (meeting human needs now) and inter-generational equity (fulfilment of basic needs of all global citizens in the future).

Sustainability is often described as resting on three pillars or having three dimensions: environmental, social and economic sustainability, as in UNCTAD's BioTrade definition. The conventional understanding of sustainable development, based on the 'three pillars' implies that restricted trade-offs can be made between environmental, social and economic dimensions of sustainability. However, in practice, development decisions by governments, industries and other actors have traditionally put greatest emphasis on the economy above other dimensions of sustainability. This is a major reason why the environment continues to be degraded and development does not achieve desirable equity goals.

2.3 Sustainable use of biodiversity

Definitions of sustainable use relative to biological resources (fish stocks, forest products) generally reflect the concern over the widely observed excessive consumptive use of biological resources leading to levels below critical thresholds, beyond which their long-term viability or very existence is put in jeopardy³. On the other hand, concerns of over-exploitation of a resource do not directly apply to agricultural biodiversity, for the biological diversity embodied in crops and animals is perpetuated as agricultural seeds and reproduced animals. The term “sustainable use” conjures the notion of the need for reconciling conservation and use of agricultural biodiversity as somehow antagonistic goals when indeed conservation of agricultural biodiversity is only possible through use, and benefits arising from its actual or potential use (or value) provide the only incentive for its conservation. The principal threat to agricultural biodiversity is ultimately not over-use but rather the under-use in agricultural systems and breeding programs.

The CBD's Addis Ababa principles and guidelines (AAPG) provide a comprehensive and normative framework for the sustainable use of biodiversity (CBD 2004). Table 1 shows where the AAPG intersect thematically with BioTrade principles and can inform each other. Since the AAPG also deal with non-commercial uses of biodiversity, they are necessarily much broader.

Recent analysis suggests that the AAPGs inadequately address agricultural biodiversity, which is distinctive in several respects from non-agricultural biodiversity and thus requires distinctive solutions.

A distinguishing feature of the use of agricultural biodiversity vis-à-vis the use of biodiversity in natural ecosystems is that agricultural practice typically requires trade-offs between the on-farm diversity on the one hand, and livelihood and development goals on the other, particularly at the plot and farm level. Productivity needs and crop uniformity requirements arising from crop and post-harvest management as well as market integration tend to reduce agricultural biodiversity, thus requiring *ex situ* conservation of landraces and traditional animal breeds.

³ For example, the CBD defines sustainable use in article 2 as “the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

Table 1: Matching Addis Ababa Principles with BioTrade principles

Addis Ababa Principle (abbreviated)	Conservation of biodiversity	Sustainable use of biodiversity	Equitable sharing of benefits	Socio-economic sustainability (management, production and markets)	Compliance with national and international legislation and agreements	Respect for the rights of actors involved in BioTrade activities	Clarity about land tenure, use and access to natural resources and knowledge
1: Supportive policies, laws and institutions are in place at all levels and there are effective linkages.	●	●	●	●	●		●
2: Local users of biodiversity should be empowered by rights to be accountable for use of the resources.		●	●	●		●	●
3: Policies that distort markets or represent perverse incentives for degradation should be removed or mitigated.		●		●	●		
4: Adaptive management through science, traditional knowledge, and feedback from use and impact assessment.		●		●			
5: Avoidance of adverse impacts on ecosystem services and components.	●	●					
6: Support of interdisciplinary research into all aspects of use and conservation of biological diversity.		●		●			
7: Spatial and temporal scales of management should be compatible with the ecological and socio-economic scales of the use and its impact.		●		●			
8: International arrangements for international cooperation where multi-national decision-making are needed.		●			●		
9: Interdisciplinary, participatory approach for management and governance related to the use.		●		●			
10: Policies need to take into account use and non-economic values of biodiversity and market forces affecting the values and use.	●	●					
11: Avoidance or minimization of waste and optimized benefits from uses.		●					
12: Local custodians of biological diversity need to benefit from the uses of these resources.		●	●			●	●
13. The costs of management and conservation of biological diversity should be internalized within the area of management and reflected in the distribution of the benefits from the use.	●	●		●			
AAP14. Implementation of education and public awareness programs on conservation and sustainable use; more effective communication between stakeholders and managers.		●				●	●

2.4 Sustainable agriculture

In light of the growing importance of agriculture and farming of wild-type species for BioTrade, this section explores the concept and practice of agricultural sustainability. There is no universally accepted definition of sustainable agriculture, given the extraordinary diversity and complexity of agricultural land use, and the perspective taken (producer, consumer, etc.).

For the purpose of this training manual, sustainable agriculture is defined as the “ability of farmland to produce food and other agricultural products to satisfy human needs indefinitely as well as having sustainable impacts on the broader environment”. Sustainable agriculture includes considerations of productivity goals, environmental stewardship, farm profitability and rural welfare objectives as well as consumer health. The principle of sustainability implies the use of resources at rates that do not exceed the capacity of ecosystems to replace them. By definition, the dependency on non-renewable inputs of contemporaneous agriculture is unsustainable, even if in the short term it is necessary as part of a trajectory toward sustainability.

There are many difficulties in making agricultural sustainability operational. Over what spatial scale should food production be sustainable? Clearly an overarching goal is global sustainability, but should this goal also apply at lower levels, such as regions, nations, or farms? Could high levels of consumption or negative externalities in some regions be mitigated by improvements in other areas, or could some unsustainable activities in the food system be offset by actions in the non-food sector (through carbon-trading, for example)?

Limited potential for the expansion of cultivated lands and the need to roughly double agricultural production over the next decades leave little alternative but to improve further the productivity of existing agricultural land in a dramatic fashion. Agricultural intensification will have to be achieved by boosting land, water, nutrient and labor productivity, while at the same time avoiding the environmental degradation caused in the past by wasteful use of resources and inputs.

Experience suggests that the dual goals of agricultural intensification and lessening the environmental footprint of agriculture can be achieved, but require the implementation of enabling policies that promote resource-use efficiency. Correcting for negative environmental externalities of agriculture, including environmental pollution and the costs of waste and poor health, will reflect the true costs of agricultural products and send accurate price signals to change production methods⁴. Rewarding farmers for providing environmental services will create incentives for farmers to engage in environmentally beneficial practices. BioTrade can be a driving force in making agriculture more sustainable, especially if price premiums provide incentives for farmers to engage in improved practices, notably with regard to nutrient, pest and disease management.

The need for increased investments in agriculture and agricultural research cannot be overstated. The development of technological innovations and the knowledge to

⁴ Agricultural intensification is primarily achieved through increased use of chemical fertilizers and pesticides, which in many parts of the world are subsidized. Relatively low costs for these inputs typically lead to their overuse, which can result in nutrient run-off from agricultural areas, and accumulation of hazardous chemicals in food chains. In addition, excessive pesticide use has been associated with poor farm worker health and detrimental effects on pollinators (e.g., bee colony collapse disorder).

underpin policy decisions as well as infrastructure improvements will require unprecedented research and development efforts. The empowerment of poor farmers who supply most agricultural produce in developing countries will require a host of policies that impact the capacity for BioTrade such as: revamping extension services, ensuring smallholders' land tenure, providing market access, and strengthening the role of women (see also section 6).

Box 3: Sustainable agriculture and Addis Ababa Principles and Guidelines (AAPGs). AAPGs are a general framework for the sustainable use of biodiversity with important messages targeted to a global audience. They are broadly applicable to agriculture. However, they are stated in very general terms, and their wording and the accompanying rationales reflect concerns about the sustainability of non-agricultural biodiversity. Identifying a set of universal principles that have global validity, may also prove elusive, or be so general as to be of little practical value. In order for the AAPGs to be of operational value in agriculture and provide meaningful guidance for improved management they would need considerable re-interpretation.

Recent in-depth examination of the AAPG concludes that existing normative agricultural frameworks aimed at greater sustainability such as Good Agricultural Practice Principles, IFOAM guidelines and many others to be "marketed" and used to a larger extent. As compared with the AAPGs, these frameworks offer more specificity in terms of thematic focus and target audiences, and greater potential to guide priority action suited to particular circumstances of the highly diverse agricultural systems. These frameworks also represent good models for the development of production principles or standards for agricultural sub-sectors for which such principles do not yet exist. If more widely applied, they have the potential to move agriculture toward a more sustainable future. Agriculture has no shortage of sustainability principles and guidelines, but judging from its environmental footprint, it certainly lacks their implementation.

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2.5 Recommended reading

CBD 2004; CBD 2010; FAO 1996; FAO 2007; FAO 2009; McNeely and Scherr 2001, 2003; MEA 2005; Orr 2006; Tilman et al. 2002; Trewavas 2001, 2002, 2004;

3 What is BioTrade?

3.1 Definition and scope

Recognizing biodiversity-based business as an increasingly important incentive for the conservation of biodiversity, the CBD defines BioTrade⁵ as the "production of value-added goods and services derived from biodiversity, both for domestic and for international markets". A number of thematic programs of work under the Convention call for the increased marketing of products derived from sustainable use along with the creation of suitable markets.

In much the same vein, UNCTAD defines BioTrade as "those activities of collection, production, transformation, and commercialisation of goods and services derived from native biodiversity under the criteria of environmental, social and economic sustainability", making more explicit the need for BioTrade not to undermine its very

⁵ <http://www.cbd.int/incentives/int-trade.shtml>

existence through unsustainable practices. However, biodiversity-based business in its broadest sense does rarely conform to UNCTAD principles (see next section). As a matter of fact BioTrade as defined by the BioTrade initiative represents a minuscule fraction of the totality of biodiversity-based business, which may range from the utterly unsustainable, even illegal exploitation of biodiversity, to highly sustainable BioTrade that conforms to particular sustainability standards. It is important to recognize that the legality of trade in a particular species is not necessarily an indication of its sustainability. Perfectly legal BioTrade, such as some wildlife trade, may actually be blatantly unsustainable.

A strict interpretation of the BioTrade definition also includes trade in fossilized plants and animals. Fossils are unquestionably derived from native, albeit extinct, biodiversity, and with the overwhelming number of species that have ever lived now being available as fossils only, there appears to be much scope for this sub-sector of BioTrade. There is a thriving trade in high-priced trilobite and ammonite species. In some parts of the world, notably in Morocco, fossils are the principle source of income of a substantial number of rural people, leading one observer to speak of the “trilobite economy”, worth US\$ 40 million in 2000 and employing 50,000 people in Morocco alone. Indeed economic interest is such that it has provided incentives for the massive faking of fossils⁶.

By the prevailing UNCTAD definition, BioTrade does not necessarily involve transactions across national borders but refers also to the commercialization of biodiversity products within countries of origin. However, as a matter of fact, much BioTrade is international, and often transoceanic in nature, owing to the fact that source countries are in the biodiversity-rich “South” whereas the consumers with the greatest purchasing power reside in the biodiversity-poor “North”.

The UNCTAD definition of BioTrade appears to include the trading of access rights to genetic resources -both agricultural and non-agricultural- between source countries and users, with the primary purpose of exploiting such resources for scientific research (taxonomy, drug discovery), for use in crop/animal breeding through conventional or biotechnological means. The UNCTAD definition also includes services from native biodiversity relevant to eco-tourism, including consumptive and non-consumptive uses.

3.2 The concept of native biodiversity

UNCTAD defines *native biodiversity* as “species, which occur naturally, or have existed in a country for many years”. What precisely constitutes “natural occurrence” is subject to interpretation and presents considerable challenges in delimiting the boundaries of the concept ‘BioTrade’, particularly in relation to crops and domesticated animals (see [Box 4](#)). Moreover, to put a number on what are “many years” would be arbitrary and unpractical.

There are also situations arising from the increasingly common farming of wild-type species off-site that suggest that BioTrade as confined by the “native biodiversity” condition is rather artificial. For instance, beluga caviar is no longer available from natural catches of sturgeon (except for a minute quantity). Beluga is obtained from sturgeon farmed in a variety of countries to which the fish is native (Russia, Iran) and introduced. Strictly speaking, farmed beluga from Italy or Israel is not BioTrade, but the associated value chains, quality management, intellectual property rights with regard to the product name, relevant international legal frameworks have many commonalities

⁶ <http://www.collectingfossils.org/MoroccanTrilobites.htm>, <http://www.thefossilstore.com>

with farmed and “natural” beluga. Moreover, the farming of wild-type animals and plants provides enormous opportunities for the maintenance and management of diversity, when such species are threatened in their native habitats (as is the case with beluga sturgeon and many other species).

Note that endemic and native biodiversity are not the same. Endemism is a rare and special condition of native biodiversity where a particular taxon (e.g. genus, species, variety) is only known to occur within a defined area. Thus the edible root maca (*Lepidium meyenii*) is endemic to Peru, as it is known to occur only in this country. Most bromeliads and cacti are known from the Americas only, hence they are endemic to this continent. Endemism is particularly well-known from islands and other geographically isolated areas. All endemism pertains to native diversity, but only a small portion of native biodiversity is endemic.

Box 4: What is native agricultural biodiversity? Crops and animal breeds have been moved by humans for millennia from their original into non-traditional areas, a process which continues into the present. Introduced crops further differentiate and evolve into novel variants that are ingrained in local culture and customs. For example, paprika spice has evolved under human selection from a fairly recent introduction of South American chili into Hungary, where it is claimed a genuinely native product of that country. On the other hand, the same paprika if produced from Hungarian seed in South America (as is currently the case) hardly qualifies as a native product although the species has its origin in South America.

The concept of native agrobiodiversity would also include commodity-type bio-products in their native range, if sustainably and equitably produced, such as soybean and coconut in Asia and cocoa in Latin America, a concept that clearly goes against the conventional perception of BioTrade as being associated with rather differentiated products. This is further complicated by the fact that within the native area of many global crops, such as for cocoa in Latin America, both commodity-type and highly differentiated fine-flavoured cocoa are being produced (Ecuador, Venezuela).

In a similar vein, an increasing share of the world’s oyster production is now derived from a limited number of introduced species and would not qualify as BioTrade. However, local maritime conditions impart distinct flavors and other quality attributes on oysters resulting in local product differentiation that can be as distinctive as if arising from genetic factors. A similar quality differentiation applies to wines and spirits, many of which are from introduced crops or varieties, yet have distinctive characteristics owing to the biosphere into which the production process is embedded (soil, fermentation agents, etc.). The exclusion of such “terroir” products from BioTrade is artificial and would appear to warrant revision of the concept of BioTrade.

3.3 Diversity of BioTrade products

It is evident from

Table 2 that BioTrade products are extremely diverse, echoing the diversity of animals, plants and other organisms as well the diversity in human intervention through processing and transformation into products. The table broadly classifies BioTrade products into products from agriculture vis-à-vis from natural habitats, since these two categories are distinct in terms of the applicability of management and sustainability principles as well as regulatory frameworks. In terms of volume, BioTrade products from farming and ranching increasingly rival those derived from natural habitats, partially owing to the fact that growing market demand for BioTrade products usually outstrips wild-harvested supplies. A case in point is the trade in reptile leather that is overwhelmingly derived from farmed animals as opposed to a fairly recent past when reptile skin were mostly taken from the wild (MacGregor 2006). A similar situation holds for many other farmed animals, herbal and medicinal species, to the extent that these can now be taken into cultivation⁷. There are additional factors driving the tendency toward farming and ranching, notably the need for greater product standardization, the possibility to spatially contain production risks, and facilitated waste management.

⁷ The cultivation of wild-type species should not be termed “domestication”. This is a term properly employed for a process by which a species undergoes, under intentional or unintentional selection pressure, significant morphological and compositional changes to suit farming methods and human uses. By contrast, the mere cultivation of a wild-type herbal species or animal does not involve such changes to a significant extent.

Table 2 also lists products that are currently in decline, restricted or outlawed but could be sustainably sourced, including bushmeat, ivory and caviar, if appropriate, science-based management systems were in place.

Stimulants from native biodiversity are illegal in many countries, but legal in others, notably in source countries, such as regionally traded and economically important coca (*Erythroxylum coca*) and qat leaves (*Catha edulis*).

BioTrade products can be derived from species better known as global commodities. Such is the case of native Andean potatoes, specialty maize and rice, all of which are highly differentiated from the respective co-specific commodity. Another case is where indigenous processing and/or local microorganisms modify an unremarkable substrate to yield a special product. For example, tapai, gari and masato are fermented local derivatives of cassava that qualify as pertaining to native biodiversity, although the substrate itself pertains to a common tropical commodity.

Table 2: Classification and examples of BioTrade products

		From agricultural production		Derived from natural populations	
		Domesticated species	Wild-type species	Gathered/caught	Hunted
Plants	Food	<ul style="list-style-type: none"> Hulled wheats Local lentils and nuts Native fruits and roots 	<ul style="list-style-type: none"> Euterpe fruit pulp Plant sap syrups (Maple, palms) 	<ul style="list-style-type: none"> Brazil nuts Camu-camu pulp 	n.a.
	Food ingredients	<ul style="list-style-type: none"> Crops with salient nutritional ("nutraceutical") properties (yacon, noni) 	<ul style="list-style-type: none"> Spices (safran, nutmeg, cinnamon) Sweeteners (Stevia) Nutraceuticals 	<ul style="list-style-type: none"> Baobab dried pulp Gums and resins Other exsudates 	n.a.
	Fermented foods*	<ul style="list-style-type: none"> Soybean derived Involving specific micro-organisms (tempeh, tapai, gari chicha) 	<ul style="list-style-type: none"> Palm wine 	<ul style="list-style-type: none"> 	n.a.
	Functional ingredients	<ul style="list-style-type: none"> Dyes Specialty starches (polvilho azedo) 	<ul style="list-style-type: none"> Essential oils Natural cosmetics Seaweeds 	<ul style="list-style-type: none"> Specialty fats (shea butter, argan oil) Seaweeds, algae Gums and resins 	n.a.
	Medicinals/ Stimulants/	<ul style="list-style-type: none"> Specialty coffees and cocoas Qat, coca, cava, betel nuts Narcotics (opium) 	<ul style="list-style-type: none"> Medicinal species Narcotics (Psilocybin mushrooms) 	<ul style="list-style-type: none"> 	n.a.
	Ornamental products	<ul style="list-style-type: none"> Live plants Ornamental gourds Basketware Specialty cotton (Peru) 	<ul style="list-style-type: none"> Cut flowers Live plants (orchids, bromeliads, cycads) Wood carvings (Asmat) 	<ul style="list-style-type: none"> Basketware (Werregue) Wild seeds for cultivation of ornamentals (Nordmann fir) 	n.a.
	NTFP	<ul style="list-style-type: none"> Herbals and aromatics (Uña de gato, <i>Prunus africana</i>) 	<ul style="list-style-type: none"> Bamboo 	<ul style="list-style-type: none"> Rattan Specialty woods (ebony, sandal wood) 	n.a.
Animals	Food	<ul style="list-style-type: none"> Meat from native breeds of domesticated mammals and birds (Kobe beef, guinea pigs, fowls) 	<ul style="list-style-type: none"> Frog legs Molluscs (snails, oysters) Crustaceans Crocodilians Game 	<ul style="list-style-type: none"> Live animals for restaurant trade Bird nests Insect larvae/imagoes (grasshoppers) Turtle eggs 	<ul style="list-style-type: none"> Bush meat Fish (eel, salmon) Caviar Shark fins
	Medicinal	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Snake poison 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Rhino horn Tiger body parts
	Clothing	<ul style="list-style-type: none"> Wool from special breeds Silk Fur 	<ul style="list-style-type: none"> Wool (vicuña) Crocodilian skins 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Crocodilian skins Fur (seal)
	Pets	<ul style="list-style-type: none"> Native dog breeds (Peruvian and Mexican hairless dog) 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Ornamental fish for aquarium trade 	<ul style="list-style-type: none"> Cage animals (birds, reptiles, etc.)
	Ornamental uses	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Butterflies (alive and mounted) and pupae Cochinilla (dye) Pearls 	<ul style="list-style-type: none"> Coral reef products Pearls Mother of pearl Sponges 	<ul style="list-style-type: none"> Ivory Turtle shell Mollusk and sea shells
	Derived animal products	<ul style="list-style-type: none"> Specialty honeys from <i>Apis mellifera</i> 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Honey from native bee species 	<ul style="list-style-type: none"> Butterfly pupae and imagoes
Fungi	<ul style="list-style-type: none"> Agaricus, Shiitake, oyster mushrooms 	<ul style="list-style-type: none"> Corn smut (huitlacoche) 	<ul style="list-style-type: none"> European and Kalahari truffles, <i>Picilobyce</i> 	n.a.	

n.a.=not applicable, *using native micro-organisms, raw materials or processing methods

3.4 The conceptual framework of the BioTrade Initiative

UNCTAD's BioTrade initiative framework seeks to combine the objectives and normative principles of the Convention on Biological Diversity, the Commission on Sustainable Development and the Millennium Development Goals, while at the same time supporting the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the United Nations Convention to Combat Desertification and the Ramsar Convention on Wetlands. Mandates from these bodies and organizations have guided the definition of the BioTrade Principles and Criteria. Implementation of UNCTAD's framework will put BioTrade on a more sustainable footing, and eventually promote the conservation of biodiversity through sustainable commercial use.

Implementation of the BioTrade framework rests on three complementary approaches:

Strengthening Value-chains, as a critical element in facilitating good practices related to the sustainable use and conservation of biodiversity and in promoting the equitable sharing of environmental, social and economic benefits among value-chain participants.

Adaptive management, which contributes to the implementation of sustainable practices based on improved knowledge of BioTrade's impacts on species and ecosystems. For instance, the BioTrade Facilitation Programme (BTFP)⁸ is supporting the elaboration of management plans as a tool to help organizations, suppliers and authorities to implement the Principles and Criteria.

The **ecosystem approach**, which integrates ecological, productive and social issues, as well as the interactions and processes that are involved in a productive system. This guarantees that the BioTrade will be environmentally and socially responsible with regard to their impact on species, habitats, ecosystems and local communities.

Table 3 gives an overview on the seven BioTrade principles and verification criteria, which guide BioTrade activities at both the institutional level (e.g. national or regional program), and the level of supply-chain actors (e.g. private company or producer group). The impacts generated from institutions or BioTrade projects should be measurable within this framework, in the context of implementing the principles. The principles guide supply-chain actors to move their operation toward environmentally sound and equitable practices.

The BioTrade framework is not designed to compete or replace existing certification schemes, nor is it intended to lead to a labeling system. Instead it plans to build upon existing mechanisms, facilitating access to these schemes –as requested by the market–, and providing criteria for the harmonization of standards. The BioTrade principles are not mandatory. They constitute the basis for organizations wanting to embark on a path of sustainability.

Comparing the seven BioTrade principles with the standards of five established sustainability certification schemes⁹ Hauselmann (2006) found these only partially meet

⁸ In autumn 2000, the UNCTAD BioTrade Initiative approached the International Trade Centre (ITC - joint programme of UNCTAD and WTO) with a view to facilitate trade in biodiversity products and services, and to identify potential international markets. UNCTAD and ITC developed the BioTrade Facilitation Programme (BTFP).

⁹ FairTade Labelling Organizations International (FLO), Forest Stewardship Council (FSC), International Federation of Organic Movements (IFOAM), Marine Aquarium Council (MAC), Sustainable Agriculture Network (SAN, also known as Rainforest Alliance).

BioTrade requirements. IFOAM fared relatively low on all sustainability criteria except for those concerned with chemical contamination and input use. Equitable benefit sharing (BioTrade principle 4) had particularly weak scores in general. The author notes that FLO scores best of all in terms of benefit sharing, but placed no emphasis on land tenure and the impact of certified producer organizations on their neighbours.

Table 3: BioTrade principles and compliance criteria (source: UNCTAD 2007)

BioTrade principle	Compliance criteria
1. Conservation of biodiversity	<p>1.1 Characteristics of ecosystems and natural habitats of managed species should be maintained</p> <p>1.2 Genetic variability of flora, fauna and micro-organisms (for use and conservation) should be maintained</p> <p>1.3 Ecological processes should be maintained</p> <p>1.4 Activities should be developed according to management plans for natural areas, in coordination with the relevant authorities and actors involved</p>
2. Sustainable use of biodiversity	<p>2.1 The use of natural resources should be supported by management documents, including extraction rates lower than regeneration rates, monitoring systems and productivity indexes</p> <p>2.2 The management of agro-biodiversity should include agricultural practices that contribute to the conservation of biological diversity</p> <p>2.3 Technical standards for initiatives of environmental services should be met</p> <p>2.4 Information and records of experiences should be compiled that contribute to knowledge of biodiversity</p>
3. Fair and equitable sharing of benefits derived from the use of biodiversity	<p>3.1 The organization should interact and involve actors along the whole value chain, where possible</p> <p>3.2 Income should be generated at all levels of the value chain, by contributing to the position of value-added products in the market, under transparent conditions</p> <p>3.3 Information and knowledge of target markets should be made available and shared among actors</p>
4. Socio-economic sustainability (productive, financial and market management)	<p>4.1 Potential markets should exist</p> <p>4.2 Financial profitability should be achievable</p> <p>4.3 Employment should be generated and the quality of life improved</p> <p>4.4 Negative impacts on, inter alia, productive and local cultural practices that affect diversification and food security should be prevented</p> <p>4.5 The organization should demonstrate organizational and management capacity</p>
5. Compliance with national and international regulations	<p>5.1 The organization should be aware of and comply with national and local legislation related to the sustainable use and trade of products and services derived from biodiversity (wildlife management, labour regulations, etc.)</p> <p>5.2 The organization should be aware of and comply with international and regional legislation related to sustainable use and the trade of products and services derived from biodiversity</p>
6. Respect for the rights of actors involved in BioTrade activities	<p>6.1 Human rights and gender issues should be respected</p> <p>6.2 Intellectual property rights should be respected</p> <p>6.3 Rights of local and indigenous communities (territory, culture, knowledge) should be respected</p> <p>6.4 Traditional knowledge should be maintained and revived</p> <p>6.5 The organization should offer labour security and proper work conditions</p>
7. Clarity about land tenure, use and access to natural resources and knowledge	<p>7.1 The organization should demonstrate land tenure according to the relevant regulations</p> <p>7.2. Access to biological and genetic resources for sustainable use should be subject to prior informed consent</p> <p>7.3 Access to traditional knowledge should be granted only where prior informed consent has been granted</p>

3.5 Recommended reading

Scree 2009; IUCN 2009; UNCTAD 2005, 2007a.

4 Benefits of BioTrade

4.1 The BioTrade market

It is quite difficult to find reliable figures of global, national or product-specific BioTrade volumes, except for a limited number of products from unambiguously circumscribed geographic ranges, production methods or endemic species.

The following factors are responsible for the difficulty to quantify BioTrade:

- Much BioTrade consists of informal and small-scale transactions within national borders that is insufficiently recorded in production and trade statistics. This is particularly notorious in the cases of wildlife or illegal products, or in developing countries with less developed recording systems.
- Even where trade values are available, such figures often aggregate BioTrade and non-BioTrade commodities, such as in the cases of sectoral agricultural production, marine catches, forestry products and natural cosmetics.
- BioTrade is not recognized as a tariff category, and it would require a major research effort to aggregate data on a plethora of native biological products to arrive at reasonably accurate figures.
- Trade figures are mostly available for specific levels of the value chain, such as farm-gate, free-on-board, import or retail level, thus making comparisons difficult.
- Finally, the intrinsic difficulty to define BioTrade, and in particular to clearly circumscribe what constitutes products from “native biodiversity” introduce a considerable degree of uncertainty in published trade figures. For example, the published oyster production in New Zealand was initially based on native species, but an accidentally introduced Pacific species that could be farmed more reliably has since dominated recorded catches.

Notwithstanding these problems and caveats, Table 4 collates, for a number of sectors and species, the respective annual value of internationally traded volumes. Some of these result from sporadically undertaken systematic research efforts, hence the outdated nature of some figures. It is clear from Table 4 that global BioTrade (excluding commercial fisheries and timber) is a multi-billion US\$ industry, probably in the middle double-digits, but because of its multi-faceted and atomized nature it is not recognized as such vis-à-vis industrial activities. Even single-species within national or regional borders can generate proceeds in the order of several hundred million US\$ as exemplified by several maritime products (pearls, oysters, lobster). For example, total South Sea pearl production from three species amounted in 2005 to approximately 500 million US\$ (Mueller 2005).

Table 4: Annual trade volumes for selected BioTrade products

BioTrade products	Geographical area	Year	Value	Comments	Source
Herbal supplements	World	2005	US\$ 21.8 billion	Includes non-native products; strongly growing in recent years	Laird and Wynberg 2008
Wildlife commodities (imported)	World	2005	US\$ 21.2 billion	Excludes domestic trade, timber and commercial fisheries; up from US\$ 5,000 in the 1980s	Roe 2008
Protected geographic indications	EU	1997	€ 14.2 billion	Figure includes also Protected Designations of Origin (wholesale)	EU 2010, Proposal for a regulation on agricultural product schemes
Cork from <i>Quercus suber</i>	Seven Mediterranean countries	2010	US\$ 2.2 billion	Stagnating market; cork industry battling the increasing market share of alternative wine stoppers	http://gftn.panda.org/ WWF 2006
Natural cosmetics ingredients	EU	2009	€ 650 million	Includes also commodities (cocoa butter, palm oil, etc.)	CBI 2009
Seaweeds (<i>Kappaphycus</i> spec., agar)	World	2009	€ 120 million	From farming	CBI 2009
Gum arabic	Sudan	2005	US\$ 102 million	Hardened sap taken from two species of the Acacia tree (<i>A. senegal</i> , <i>A. seyal</i>)	UN Statistics Division COMTRADE database
Brazil nuts (<i>Bertholletia</i>)	World	1998	US\$ 30 million	From Bolivia, Brazil and Peru; corresponding to 2% of total world nut market	Collinson 2000
Western Rock Lobster (<i>Panulirus cygnus</i>)	Australia	2004	Au\$ 250 million	20% of total Australian fisheries value	www.rocklobster.wa.com/
Pacific oyster (<i>Crassostrea gigas</i>)	New Zealand	2008	US\$ 18 million	Starting in the 1960 from native species, but replaced with an introduced species	www.aquaculture.govt.nz
South Sea Pearls from the white-lipped oyster <i>Pinctada maxima</i>	Australia, Indonesia, Philippines, Myanmar	2005	US\$ 248 million	Cultured pearls; Production value up from US\$ 24 million in 1983	Müller 2005
South Sea Pearls from the black-lipped oyster <i>Pinctada margaritifera</i>	French Polynesia	2005	US\$ 125 million	Farmed oysters have totally replaced the catch of wild oysters for pearl extraction	Müller 2005
Abalone aquaculture	Australia	2007	Au\$ 43 million	Abalone production in Australia expected to double in the next 5-10 years, owing to strong global demand	www.thefishsite.com
Fossil trilobites	Morocco	2000	US\$ 40 million	For export; trade strongly increased since 1990s	Sicree 2009
Quinoa grain (<i>Chenopodium quinoa</i>)	Bolivia	2009	US\$ 39 million	Mostly organic production, up from export value of US\$ 100,000 in 1980	www.opinion.com.bo , 20 March 2010
Devil's claw (Harpagophytum procumbens)	Namibia	2008	US\$ 3.1 million	Wild-harvested tuberous roots are used medicinally to reduce pain and fever, and to stimulate digestion	ICIMOD 2010

Cochineal (<i>Dactylopius coccus</i>)	Peru	2010	US\$ 209 million	Crimson-colored dye derived from sessile insects feeding on <i>Opuntia</i> cacti. 2007 export value: US\$ 38 million	Ivanova 2011
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Wildlife trade is a particularly noteworthy global economic sector.

Table 5 provides a breakdown of trade figures according to wildlife product categories. For comparison, this table also shows the value of global commercial fisheries and timber.

Table 5: Estimate of the value of international wildlife trade in 2005 (adapted from Roe 2008)

Product category	Estimated value in 2005 (US\$ million)	
Live animals		504
Primates	94	
Cage birds	47	
Birds of prey	6	
Reptiles and amphibians	38	
Ornamental fish	319	
Animal Products for clothing/ornaments		5,530
Mammal furs and fur products	5,000	
Reptile skins	338	
Ornamental corals and shells	112	
Natural pearls	80	
Animal products for food (excluding fish)		898
Game meat	773	
Frog legs	50	
Edible snails	75	
Plants		35,532
Medicinal plants	1,300	
Ornamental plants	13,000	
TOTAL (not including fisheries and timber)		21,232
Wild fisheries		81,500
Timber		190,000

The difficulties associated with accurately determining BioTrade size also affect the estimation of aggregate BioTrade growth rates. However, examination of the time series of sales for selected species suggests that BioTrade constitutes a rapidly growing sector of the world economy, and that growth rates have particularly accelerated in recent

decades. For example, the production value for pearls from the white-lipped oyster grew from US\$ 24 million in 1983 to US\$ 248 million in 2005, i.e. 11% p.a. over 22 years (Mueller 2005). The value of quinoa exports from Bolivia increased on average a staggering 22% p.a. since very modest beginnings in 1980. The export value of non-timber forest products from Nepal grew six-fold in the last 6 years.

In some countries, BioTrade now accounts for a significant and growing percentage of the national economy. In Namibia, for example, BioTrade (mostly hunting tourism, wildlife viewing, specialty crops and livestock) currently contributes 4.5% to GDP. This contribution is likely to triple in the next 30 years (Zeidler et al. 2011). The export value of BioTrade products from Peru was about US\$ 318 million in 2010, up from some US\$ 60 million in 2004.

4.2 BioTrade growth

Several factors are behind the rising demand for BioTrade products, notably the increasing wealth and purchasing power of societies around the world, the persistent reliance of the world's poor on natural resources for food and income, and a trend for farming to deliver an increasing share of BioTrade.

Consumers demand increasingly wild and/or exotic plants and animals and products made from them as a source for food, medicine, pets, display, fashion and as household items. Use may be local to the resource itself, e.g. hunting for meat for direct consumption, or take place many thousands of miles away in which case the wildlife products pass along a complex processing and trade chain from harvester to end-consumer.

Demographic change, especially aging and immigrant populations, have lead to a previously unseen demand for new health, functional and ethnic food. The desire for dietary diversification and consumer unease about industrial production methods further motivates the search for new ingredients from sources that are perceived as less "artificial". Moreover, fierce competition in the food market forces companies to differentiate, and add value to, their products through novel ingredients and flavors, many of which are derived from biodiversity native to tropical countries. Table 6 presents the attributes of a selection of promising food species from Peru, a region known to contain many useful but underutilized foods. If sourced from environmentally sustainable and ethically managed production systems, such products have additional appeal in particular market niches.

The proliferation of specialized and international trade fairs in recent years such as Health Ingredients and Ethnic Specialty Food (Paris), Vitafoods (Geneva) and Biofach (Nuremberg, Germany) further testifies to the growing commercial interest in 'exotic' traditional foods.

Table 6: Traditional edible plants from Andean South America increasingly traded as "novel food"

Common and scientific name	Family	Uses in human nutrition	Salient properties of commercial interest
Arracacha (<i>Arracacia xanthorrhiza</i>)	Apiaceae (Umbelliferae)	Edible root with peculiar flavour, also grown in Brazil	Unique flavor, low syneresis starch
Mashua (<i>Tropaeolum tuberosum</i>)	Tropaeolaceae	Edible root, widely used in Andes	Piquant flavor, rich in mustard oils
Oca (<i>Oxalis tuberosa</i>)	Oxalidaceae	Edible tuber, widely eaten	Colored, visually attractive

		in the Andes	tubers, specialty "potatoes"
Maca (<i>Lepidium meyenii</i>)	Brassicaceae (Cruciferae)	Traditional tonic, Peru	High antioxidant content
Yacon (<i>Smallanthus sonchifolius</i>)	Asteraceae (Compositae)	Edible root, eaten raw	High in fructans, recognized for gut health
Cañihua (<i>Chenopodium pallidicaule</i>)	Chenopodiaceae	Andean grain	Exceptionally high in iron content, balanced protein, substitute for gluten containing cereals
Camu camu (<i>Myrciaria dubia</i>)	Myrtaceae	Amazonian fruit, mostly collected wild	Exceptionally high in Vit C content
Lucuma (<i>Lucuma obovata</i>)	Sapotaceae	Fruit from sub-tropical valleys	Fruit pulp for gourmet market
Andean Elderberry (<i>Sambucus nigra</i> var. <i>peruviana</i>)	Caprifoliaceae	Temperate fruit, and medicinal tea from flowers	Fruit for gourmet market, superior to European Elderberry
Ungurahua (<i>Jessenia bataua</i>)	Arecaceae (Palmae)	Amazonian tree with fruits yielding edible oil	Nutritionally balanced fatty acid composition of oil
Peach palm (<i>Bactris gasipaes</i>)	Arecaceae (Palmae)	Amazonian tree with edible fruits	Nutrient-dense fruits

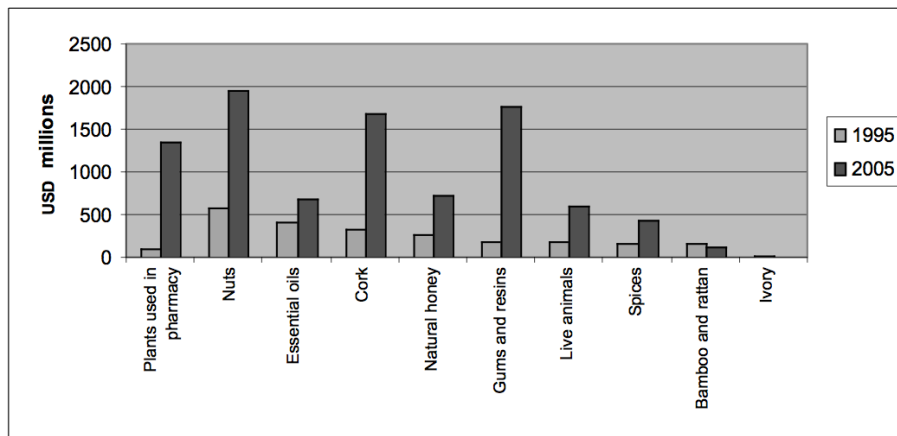


Figure 1: Changes in the value of the reported international trade in major wild resources from 1995 to 2005 (Source: UN Statistics Division Commodity Trade Statistics Database)

Rising demand that all too often outstrips the capacity of natural systems to replenish a resource provides the key incentive for the emergence of farming methods for BioTrade products that may entirely replace traditional take-off from the wild. Indeed, where in principle possible, farming has often played a key role in the growth of BioTrade of myriad products, such as crocodilian skin, pearls, oysters, high-value river fish, a range of herbal products and native fruits.

For example, farming of abalone began in the late 1950s and early 1960s in Japan and China. Since the mid-1990s, there have been many increasingly successful enterprises to commercially farm abalone for the purpose of consumption. Over-fishing and poaching have reduced wild populations to such an extent that farmed abalone now supplies most of the abalone meat consumed.

4.3 BioTrade and poverty alleviation

4.3.1 The importance of BioTrade to the poor

Benefits from BioTrade accrue to people across the social spectrum, ranging from the subsistence farmer, wildlife hunter and shell collector to large businesses and affluent consumers. However, to no other group is BioTrade more important than to the rural poor. Indeed to many poor people in developing countries, BioTrade is the only or predominant source of income, and often an important source of food and other vitally important products. The dependence of the poor on natural resources is a notoriously underreported phenomenon. It seems unreasonable and unexpected to the citizens of a globalizing and urbanizing world, that so many of the world's population should derive significant benefits from remote forests, estuaries, maritime environments, and from the multitude of mostly little-known animals and plants.

The difficulties in assessing the value of BioTrade, and its atomized and dispersed nature make it almost invisible to national and global policy and decision makers. They are rarely factored into estimates of gross domestic product. A major research effort would be required to quantify BioTrade's importance to the poor, but the following figures may illustrate the magnitude of the issue:

- Estimates of the number of people dependent on wild resources for at least part of their income range from 200 million worldwide to one billion just in Asia and the Pacific.
- Nearly 500 million people depend on coral reefs for food, coastal protection, cultural items, and tourism income (see [Box 5](#)).
- Uganda's lake fisheries, an industry worth over US\$200 million a year, employ 135,000 fishers and 700,000 small-scale operators in processing, trade and associated industries, generate US\$87.5 million in export earnings and contribute 2.2% to GDP.
- Cork oak landscapes cover approximately 2.7 million hectares of Portugal, Spain, Algeria, Morocco, Italy, Tunisia and France and provide a vital source of income for more than 100,000 people.
- In Guyana, wild animals are by far the most important commercial NTFP, with exports worth [up to](#) US\$2 million per year in the late 1990s.
- Nepal generates US\$ 35 million from NTFP trade. Close to 200,000 people derive benefits from the harvesting, trade and processing of medicinal and aromatic plants (ICIMOD 2010)
- In Brazil's Amazonas municipality, collection of *Paracheirodon axelrodi* for the aquarium fish trade is responsible for 80% of the income to the municipality.
- In Peru, approximately 27,000 people (38% of the population) in the Department of Madre de Dios depend directly or indirectly on the Brazil nut trade. This figure includes

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not only the nut collectors, but processors who split the nuts and transport them from the forest to the shipping point, hauliers who transport the nuts to the main towns of Madre de Dios and shellers (women contracted by the 'castaneros' or trading companies to shell the nuts). Brazil nuts have become the principal factor that prevents the poorer members of the population of this isolated province from becoming even more impoverished. The trade is also the principal factor that restricts the advance of deforestation into the virgin forests of the Amazon.

- Namibia's exports of devil's claw, now worth US\$ 3.1 million, provide the sole income to 2300 rural harvesters. A recent country study on BioTrade in Namibia (UNEP, 2012) concludes that revenues from some BioTrade products have higher poverty reduction dividends than revenues from other economic sectors.

Box 5: BioTrade, the poor and the decline of coral fisheries: Almost 75% of the world's coral reefs occur in developing countries, where human populations are increasing rapidly. Although coral reefs occupy only 0.1% of the ocean surface, their fisheries account for 2-5% of global catches (1.4-4.2 million tons). Reefs provide irreplaceable sources of animal protein for fisher families. Probably 30 million of the poorest people depend entirely on coral reefs for food. Coral reefs are especially important for some of the smallest and most vulnerable countries in the world, made up entirely of coral reefs and few resources other than these. Ecotourism based on healthy coral reefs offer the best chance to develop sustainable economies for these countries.

Yet coral reefs throughout the world are being degraded rapidly, especially because of overfishing and the increasing use of destructive fishing. A major problem is the growing international trade for live reef fish for the restaurant trade in Asia. These fish are often caught by mobile fleets using cyanide, and targeting species that are territorial on reefs. This leads to serial depletion of large coral reef fisheries, and to reefs being devastated by cyanide poisoning. Coral reefs are under dual attack from climate change and a growing number of fishers entering the trade. A 2004 scientific assessment on the status of coral reefs concludes that there is "little chance for sustainable reef fisheries" (Wilkinson 2004).

Rural economies tend to be highly reliant on forest and wetland resources that complement outputs from agricultural production. In countries with large proportions of rural populations, as in Cambodia with 90% of poor households residing in rural areas, the importance of natural resources translates into a priority for both national development and poverty alleviation.

Unsustainable BioTrade caused by over-harvesting, habitat loss and environmental degradation can undermine development and poverty alleviation. The poor surviving below the national poverty line in developing countries are less able to access or afford alternative sources of livelihoods when natural resources are in decline. The loss of animal and plant species thus undermines a basic means of production and erodes vital coping mechanisms for the poor.

Reliance of the poor on BioTrade is particularly high in remote areas. However, the poor can take advantage of their privileged access to wild animals and plants, indigenous cultivars and specific agro-ecological production niches. Also, where the production and processing of BioTrade products does not involve significant economies of scale, large-scale value chain operators will not be more competitive and replace small-scale producers. An example for privileged access of the poor to natural access is the sector of medicinal plants and NTFPs in Nepal. High-value NTFPs are more abundant at high altitudes in Nepal. Thus, the economic benefit of NTFPs mostly goes to people in the rural areas living high in the mountains.

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Box 6: The scale and significance of household income from BioTrade products

Cambodia	Resin collection, primarily for export to Viet Nam for use in the boat building industry, can earn families US\$38–50 per month
Cameroon	Harvesters of edible palm weevil larvae average a monthly income of US\$71, compared to US\$28 for cocoa producers
China	One kilogramme of matsutake mushrooms can earn a harvester more money than the average annual wage in Yunnan Province
East Africa	Wild meat trade contributes up to 34% of household income in East and Southern Africa
Kenya	In the Arabuko-Sokoke Forest, hunters can earn US\$275 per year by selling meat compared to an average per capita income in this area of US\$38 (Bennett and Robinson, 2000)
Kenya	Woodcarvers can earn at least US\$1125 per month selling through a cooperative
Namibia	Half the national population (1 million) derived in 2011 benefits from BioTrade
Nepal	Collectors of jatamansi rhizomes (<i>Nardostachys grandiflora</i>) earn US\$ 70-104 per season (for 5-6 collecting trips each lasting 2-5 days)
Peru	The capture of a single mouth-brooding male Silver Arowana fish <i>Osteoglossum bicirrhosum</i> in Isla Verde or San Juan represents cash earnings of US\$12–230 compared to an average daily wage of US\$2–3
Philippines	In the central part of the country, seahorse fishers and traders report that seahorses contribute approximately 30–40% to their annual income
South Africa	Medicinal plant sellers earn a mean annual income of US\$2,680
Southern Africa	At least 9000 rural people in Botswana, Namibia and to a lesser extent South Africa rely on harvesting Devil's Claw <i>Harpagophytum</i> spp., often as their only source of income

4.3.2 The need for equitable BioTrade value chains

Aid donors increasingly assist developing countries to promote trade and investment in biological resources, with the aim of contributing to poverty alleviation and biodiversity conservation. For examples, UNCTAD's BioTrade initiative seeks to facilitate access of biodiversity products from developing countries to international markets. In pursuing this goal, BioTrade's regional programs Biocomercio (Andes) and Bolsa Amazonia (Amazonian countries) place much emphasis on building equitable and environmentally sustainable supply chains that originate in poor, but diversity-rich communities. Numerous development and research projects are concerned with the goal of linking poor farmers, the originators and custodians of agricultural biodiversity, with the emerging market for exotic food species.

It is beyond the scope of this paper to assess to what extent the rural poor actually benefit from raised export chains. However, marketing companies increasingly embrace outside fair-trade principles and link with poor farmers, who benefit in terms of contract farming, higher prices and/or purchase guarantees.

It is often observed that primary agricultural producers and suppliers of raw materials capture only a low percentage (typically in the lower single digits) of the retail value of a BioTrade product. However, this cannot be automatically taken to indicate a lack of equity, or the unfair pricing of primary materials. It is well known that a high share of retail value may be attributable to capital-intensive value-adding, and the much higher labor costs in importing countries.

In any case, a number of BioTrade activities, such as the natural ingredients sector in Nepal seek to establish processing and value-adding capacities in producer countries in order to capture a higher proportion of final retail value. Also, it needs to be borne in mind that the greater the control of producers over primary product quality, the better is their reputation and negotiation power with buyers, which tends to result in price premiums that can be considerable.

In Namibia and elsewhere, it has been found that those with more assets and greater levels of social capital are more likely to become protagonists with wildlife tourism and other specific BioTrade activities. Economic elites may thus capture the benefits derived from such sectors, and BioTrade and conservation projects can lead to a widening of income disparities, with few benefits trickling through to the poor.

4.3.3 BioTrade and gender

Throughout the world women have higher representation amongst the poor. Countries that have taken positive steps to promote gender equality are known to have substantially higher levels of economic growth. Failing to effectively harness the creativity and effort of at least half the population inevitably undermines the potential for growth, with serious implications not only for women themselves but for household and national poverty reduction.

Women have prime responsibility for children and family welfare, which makes them key actors in poverty reduction. It is now well understood that increased household income through BioTrade or other activities does not translate necessarily into greater family welfare. Disposable income available to women is –universally- more likely to be spent on household needs, in particular better nutrition and education. Gender equality of opportunity and women’s empowerment in BioTrade must therefore be essential components of poverty reduction strategies.

Women and men are likely to be involved at different stages of BioTrade chains as producers and entrepreneurs, in marketing and as consumers. Those areas where women are involved are often less visible and may be overlooked in both analysis and development. Unless gender analysis is an integral part of the analysis of BioTrade value chains, strategies for upgrading may further disadvantage women. Interventions may ignore women altogether. Enterprises may arbitrarily be assumed to be ‘male owned’ even where women may be important to their management and operation; or they may be based on inaccurate stereotypes of women’s capacities and situation, excluding them from support and hence giving men an advantage in markets or employment. This has implications not only for gender equity and women themselves, but reduces economic growth and perpetuates cycles of poverty. Therefore, gender

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equity concerns should be mainstreamed in BioTrade.

Some strategies for the empowerment of women are presented in Table 7. Mostly, these are interventions that have general validity in relation to value chains.

Table 7. Some mutually reinforcing strategies to empower women in BioTrade.

Increase in enterprise productivity	<ul style="list-style-type: none"> • Technical and managerial training, literacy and numeracy for women • Improved access to finance (e.g. micro-credit) • Improved childcare support
Decrease in women's economic and social vulnerability	<ul style="list-style-type: none"> • Gender training for women and their families to enhance women's decision-making in the family • Strengthening support networks in the community including protection of women against violence • Access to financial services for consumption, pensions, housing loans and savings facilities • Improvements in wider social security, health and education provision for very poor women
Strengthening women's negotiating power within markets and value chains	<ul style="list-style-type: none"> • Strengthening women's market information networks • Improved facilities for women in markets and measures to counter discrimination • Organisational training for networking and collaboration • Formation of networks and information centres and dissemination on women's rights, subcontracting conditions and labour legislation • Strengthening women's understanding of BioTrade regulations, and income opportunities
Favorable macro level policies	<ul style="list-style-type: none"> • Changes in property rights to end gender discrimination • Legal recognition and protection of BioTrade micro-enterprises and removal of restrictive policies and harassment • Establishment of Codes of Conduct governing negotiations of subcontracting, working conditions and anti-discrimination measures. • Establishment of institutions to represent women as informal sector workers in economic policy-making. • Gender mainstreaming in the private sector development policies and programs of national governments and international development.

Women's empowerment is not only relevant where substantial numbers of women are involved in particular BioTrade value chains, or where the explicit goal focuses on gender equality, but also when targeting male dominated industries that raise questions about why women are excluded from these industries and whether women are actually involved in invisible activities. In terms of policy, appropriate responses to reducing male poverty may be to introduce interventions to increase the incomes of women in their households.

4.4 BioTrade and environmental sustainability

BioTrade and poverty reduction is dependent on a secure natural resource base. The Millennium Ecosystem Assessment (MA) highlights the linkages between that natural resource base and human well-being: biodiversity underpins the delivery of a range of ecosystem services upon which all of humanity depends. Well-managed BioTrade based on sustainable production or off-take levels can provide incentives for conservation and hence secure the natural resource base on which many poor people's livelihoods depend.

Over the past 50 years, humans have changed ecosystems more rapidly and extensively than ever, largely to meet rapidly growing demands for food, fresh water, timber, fiber and fuel. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth. The changes that have been made to ecosystems have contributed to substantial net gains in human well-being and economic development, but these gains have been achieved at growing costs in the form of the degradation of many ecosystem services and the exacerbation of poverty for some groups of people.

These problems, unless addressed, will substantially diminish the benefits that future generations obtain through BioTrade. The MA argues that the degradation of ecosystem services could grow significantly worse during the first half of this century and is a barrier to reducing global poverty and achieving the Millennium Development Goals.

Many options exist to enhance BioTrade in ways that reduce negative trade-offs or that provide synergies with other ecosystem services. However, much trade in wildlife has not been well managed and as a result, ecological degradation has occurred. Trade in wild meat in East and Southern Africa is largely illegal. As a result, although the trade continues in a clandestine way, there is little incentive for the rural poor to engage in sustainable management of wildlife resources and significant population depletions have occurred. Similarly, fisheries across the world notoriously suffer from unsustainable practices. Of the 50,000–70,000 plant species used medicinally worldwide, around 15,000 are thought to be threatened by over-exploitation and habitat loss.

Unless it is sustainable and well managed, wildlife trade can cause direct harm through over-exploitation of targeted species, to the point where the survival of a species is put in jeopardy. Currently, nearly 30% of Globally Threatened Birds are threatened by over-exploitation, mainly through hunting for food and trapping for the cage-bird trade. For some species that are especially highly sought after, over-exploitation is causing huge declines in both numbers and range, and is known to be the most significant threat to them. One in four mammals, one in eight birds, and one third of all amphibians are threatened, as are over 8000 species of plants, fungi and algae. Over-exploitation is identified as one of the main threats to wild species on the Red List (IUCN, 2007a).

There is, however, a growing number of examples where BioTrade has not only become sustainable –often after a period of flagrant over-exploitation–, but is also providing conservation incentives, or income for the protection of previously threatened species.

In response to significant elephant population declines in the 1970s and 1980s because of poaching for ivory, the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES) banned the international trade in Asian and African elephant species. In the meantime, several Southern African [countries](#) implemented sound wildlife management policies and, as a consequence, their elephant populations have recovered, necessitating the culling of elephants to avoid populations reaching unsustainable size. These countries have been allowed under CITES to auction off ivory stockpiles. Although ivory trade opponents allege that this sale stimulated ivory demand, resulting in a renewed surge of elephant poaching, recent research has shown that there

is little evidence to support that claim. Elephant conservation and public welfare can be better served by legal ivory trade than by a trade ban, but in the face of corruption and deficient law enforcement, one study concludes that “until demand for ivory can be restrained and various monitoring and regulation measures are put into place it is premature for CITES to permit ivory sales”.¹⁰

Another success story is the growing number of commercial crocodylian conservation initiatives. Uncontrolled exploitation in the past and growing demand for crocodylian skins provided the incentives for captive breeding, which have almost completely replaced the offtake of wild animals. So successful has been the development of captive management methods, that skins from farmed or ranched animals are now the preferred quality standard of the fashion industry. It is of a certain irony that (legitimate) concerns have been voiced that the waning importance of wild crocodylians to the industry translates into diminishing incentives for the conservation of crocodylian habitats, and observers of the industry have called for re-stimulating trade of wild crocodylian skins by re-valuing “classic” skins in vanguard luxury brands.

In a similar vein, the failure of sustainably managing sturgeon (for the highly coveted beluga caviar) in the Caspian has in part been attributed to the phenomenal increase of farmed sturgeon (mostly elsewhere) over the last 10 years that has almost entirely replaced declining harvests of wild sturgeon. This, in addition to illegal harvesting, is believed by some to have eroded the incentives for sustainable management of beluga. Based on data illustrating the precarious status of sturgeon populations, scientists have disputed this claim, arguing that farmed sturgeon is our best tool to restock natural habitats, and urging a moratorium on the exploitation of wild sturgeon to avoid further extinction (some sturgeon species have entirely, and others locally, disappeared).

The controlled trade in the wool from some previously threatened camelid species, including the Andean vicuña, has not been the subject of such controversy. It is considered important in securing the conservation status of these species.

Finally, BioTrade can be the *conditio sine qua non* for the preservation of entire ecosystems and the biodiversity contained therein. Such is the case of the cork industry, which employs some 100,000 people in seven Mediterranean countries. Cork is the bark of the cork oak (*Quercus suber*), a charismatic and long-lived tree that dominates expansive landscapes known as one of the most diverse habitats including large numbers of migratory birds and some of the world’s most endangered species (Iberian Lynx, Iberian Imperial eagle, Barbary Deer). Revenues from cork oak forests have provided the means for their management and conservation since antiquity. Yet, the increasing markets share of alternative wine stoppers is lessening the value of cork and the traditional links between the wine and cork industries are attenuated. On current trends, one to two million ha of cork oak forests could be lost or abandoned in the next 10-15 years (this is half to two-thirds of the current cork oak forest area), with associated loss of employment, impacts on local people (with a loss of 62,500 jobs) and the loss of biodiversity and the cultural values attached to an ancient landscape, as well as ecosystem services such as protection against fires and desertification. Calls have been made for the wine industry to consider the environmental and socioeconomic values of cork, and by choosing cork and promoting its use among customers.

4.5 BioTrade and the Millennium Development Goals

¹⁰ www.aseanbiodiversity.info/abstract/51006445.pdf

The Millennium Development Goals (MDGs) are eight international development goals that all 192 UN member states and a number of international organizations have agreed to achieve by the year 2015. The aim of the MDGs is to encourage development by improving social and economic conditions in the world's poorest countries. Table 8 gives an overview on the MDGs. The more specific targets under each MDG are omitted from this table.

Previous sections of this chapter have concentrated on the contributions of BioTrade to MDGs 1, 3 and 7. However, sustainable BioTrade can be expected to contribute significantly to the other MDGs, principally via the effect of greater incomes and better nutrition on education and health (see Table 8). BioTrade has already strengthened the global partnership in terms of providing normative input to the international conventions that have arisen in response to declining ecosystems and biodiversity loss (see chapter 5).

Table 8: The contributions from BioTrade toward the Millennium Development Goals

Millennium Development Goal	Contributions from BioTrade
MDG 1: Eradicate extreme poverty and hunger	Income from wildlife trade can be significant for some, and even where the actual amounts are small they can represent the only source of cash. Income can be earned directly—as harvesters or traders—or indirectly through employment throughout the value chain. Sustainable wildlife trade can also contribute to food security, either directly by providing access to wild and cultivated food products or indirectly by increasing the amount of income available to spend on food.
MDG 2: Achieve universal primary education	Indirect contribution, but income from BioTrade trade can replace the need for child labour, and help pay school fees.
MDG 3: Promote gender equality and empower women	Some components of BioTrade involve a large number of women, however challenges remain for women to derive greater benefits.
MDG 4: Reduce child mortality rate	Sustainable BioTrade can contribute to health improvements through improved nutrition, improved access to traditional medicines, as emergency food sources and fuel_wood, and increased incomes for healthcare.
MDG 5: Improve maternal health	
MDG 6: Combat HIV/AIDS, malaria and other diseases	
MDG 7: Ensure environmental sustainability	Well-managed BioTrade can enhance the sustainability of the natural resource base, and enhance ecosystem services— but much wildlife trade is currently unsustainable and undermines the natural resource base on which many poor people's livelihoods depends.
MDG 8: Develop a global partnership for development	Wildlife trade can encourage partnerships between trading nations, such as through CITES, and between responsible businesses and local communities. However, poor governance regimes are limiting the potential of the trade and greater assistance is required from the international community in addressing this.

4.6 Recommended reading

Challe and Price 2009; Collinson *et al.* 2000; Escobedo 2010; GEF 2006; Gurung 2010; ICIMOD 2010; Millennium Ecosystem Assessment 2005; MacGregor 2006; Mayoux and Mackie 2007; Mori 1992; Pikitch *et al.* 2005; Roe 2008; Singh *et al.* 2006; Stiles 2004; TRAFFIC 2008; TRAFFIC 2010; WWF 2006; Wilkinson 2004; Zeidler *et al.* 2011.

5 International frameworks relevant to BioTrade

This section presents international treaties, which although not designed to regulate BioTrade, condition it in terms of providing normative frameworks for the management of natural resources, sustainable use and benefit-sharing with the local custodians of biodiversity. The text cannot do justice to the enormous complexity of these treaties and the body of literature concerning them that has emerged over the years. This treatment will therefore concentrate on issues relevant to BioTrade.

5.1 Convention on Biological Diversity (CBD)

While past conservation efforts were aimed at protecting particular species and habitats, the CBD is the first global and legally binding agreement of 193 nations to address comprehensively all aspects of biodiversity. Member countries that join the CBD are obliged to implement its provisions.

The agreement covers all ecosystems, species, and genetic resources. It links traditional conservation efforts to the economic goal of using biological resources sustainably. It sets principles for the fair and equitable sharing of the benefits arising from the use of genetic resources, notably those destined for commercial use.

The CBD obliges member countries to:

- develop national strategies, sectoral plans and programs as well as policies for the conservation and sustainable use of biological diversity;
- identify components of biological diversity important for its conservation and sustainable use;
- monitor the components of biological diversity identified, paying particular attention to those requiring urgent conservation measures;
- identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity;

The CBD marks a basic change in the international status of genetic resources. Prior to the Convention, these resources were considered to be the "heritage of mankind". Although the intent of this open access regime was to ensure the widespread availability of genetic resources for agriculture and industry, but there was a perception that commercial use of the resources provided no additional economic incentive for conservation by source countries. The CBD intends to correct this policy failure by establishing that states have sovereign rights over their genetic resources, thereby enabling market incentives to fund biodiversity conservation. There is now universal consensus that the decline of biodiversity can only be reversed if greater incentives for its conservation will be provided through sustainable use and the equitable sharing of benefits. Biodiversity-based business or BioTrade is at the heart of this agenda.

However, parties to the CBD encountered a number of obstacles to translating the broad right of "biodiversity sovereignty" into specific policies, laws, and regulations that enable conservation and development objectives. For instance, national access regimes, such as Decision 391 of the Andean community with its restrictive rules, have discouraged investments in bioprospecting activities and emerged as barriers to the exploitation of biodiversity, thus defeating the original purpose of facilitating BioTrade and research. However, the recent approval of the Nagoya protocol, a comprehensive international regime of access and benefit-sharing of CBD Parties, has been heralded as a great

break-through towards the fulfillment of CBD goals (see section 7.3).

In 2002, the parties to the CBD committed themselves to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level. Known as the 2010 biodiversity target, it was also incorporated as a new target under one of the Millennium Development Goals, namely “Ensure Environmental Sustainability”. However, the Third Global Biodiversity Outlook¹¹, a recent compliance assessment based on national reports submitted by CBD parties, concludes that the target has not been met. Moreover, the Outlook warns, the principal pressures leading to biodiversity loss are intensifying in some cases, bringing the world closer to a number of potential tipping points that would catastrophically reduce the capacity of ecosystems to provide essential ecosystem services. The poor, who tend to be most immediately dependent on them, would suffer first and most severely. At stake are the principal objectives outlined in the Millennium Development Goals: food security, poverty eradication and a healthier population.

UNCTAD’s BioTrade Initiative is an indirect outcome of the CBD and its emphasis on the conservation and sustainable use of biodiversity, and the fair and equitable sharing of benefits.

5.2 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

In force since 1975, and with 175 member countries¹², CITES’ aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES accords varying degrees of protection to some 28,000 species of plants and 5,000 species of animals¹³.

CITES does not take the place of national laws, but provides a legally binding framework to member countries that must adopt their own domestic legislation to implement CITES at the national level. Domestic legislation has often implementation deficits. These may include the lack of: (1) designated management and scientific authorities, (2) laws prohibiting the trade in violation of CITES, (3) penalties that represent sufficient deterrents to such trade, (4) laws providing for the confiscation of illegally trade specimens.

CITES subjects international trade of CITES-listed species to import, export and re-export controls through a system of country-specific export quota, which are established per calendar year. For a country to be allowed to issue export permits, its scientific authority must advise that the proposed export will not be detrimental to the survival of the species. Thus, the responsibility for establishing quotas lies with each member country except for those cases where a CITES Conference of the Parties has set quotas¹⁴. There has been increasing willingness within member countries to allow for trade in products from well-managed populations.

Each protected species or population is included in one of three lists, called Appendices, according to the extent of the threat to it and the controls that apply to the trade.

¹¹ Global Biodiversity Outlook 3; <http://gbo3.cbd.int/home.aspx>

¹² Countries that have agreed to be bound by the Convention, also called “Parties”

¹³ <http://www.cites.org/eng/disc/species.shtml>

¹⁴ <http://www.cites.org/eng/resources/quotas/index.shtml>

Appendix I lists some 800 species that are threatened with extinction and are affected by trade. Trade in wild-caught specimens of these species is mostly illegal, but can be permitted in exceptional circumstances. An export permit from the country of origin (or a re-export certificate from other exporting countries) and an import permit from the country of importation are required. Trade of captive bred animals or cultivated plants of Appendix I species are considered Appendix II specimens, requiring assurances from the respective management authority, that export of permitted specimens will not adversely affect the wild population.

The vast majority of CITES species (32,500) are in Appendix II. These are species that are not necessarily threatened with extinction, but may become so unless trade is strictly controlled. Species are also included in Appendix II if they are difficult to distinguish from other species in Appendix II, in order to make it more difficult for illegal trade to take place through misidentification, mislabeling or taxonomic disputes. International trade in specimens of Appendix II species may be authorized by the granting of an export permit or re-export certificate. In practice, many hundreds of thousands of Appendix II animals are traded on an annual basis. No import permit is necessary for these species under CITES.

Appendix III, about 170 species, are species that are listed after one member country has asked other CITES member countries for assistance in controlling trade in a species, by permitting trade in all member countries only with an appropriate export permit and a certificate of origin.

CITES focuses on trade at the species level. It seeks to prevent unsustainable use but it does not address habitat loss, ecosystem approaches to conservation, or poverty alleviation, which are domains of the CBD. UNCTAD's BioTrade initiative cooperates with the CITES secretariat and national focal points to mainstream CITES into BioTrade programs and projects. In particular, this collaboration seeks to support implementation by promoting business opportunities for entrepreneurs that comply with CITES requirements and implement national legislation. Particular attention is paid to the role of incentive measures for the sustainable management of CITES-listed species and benefit-sharing with local communities that most directly affect the habitat of the species concerned. The BioTrade initiative has enhanced exchange of information, provided opportunities for discussion and promoting joint work among BioTrade National Programs and CITES authorities. In a number of countries, it has also provided technical assistance for the design of strategies for the wildlife sector, supported local producer communities, elaborated species management plans, and helped revise national legislation (UNCTAD 2007).

5.3 Convention on Wetlands of International Importance (Ramsar Convention)

The Ramsar¹⁵ Convention, or Ramsar in short, calls for the conservation and sustainable utilization of wetlands¹⁶. With 159 member countries, and including nearly 2000 wetland sites (known as Ramsar Sites) that cover some 2 million km², this convention seeks to stem the progressive encroachment on, and loss of, wetlands, recognizing the

¹⁵ It is named after the town of Ramsar in Iran, where the convention was first adopted in 1971.

¹⁶ The Convention's definition of wetlands covers both natural aquatic ecosystems (lakes, rivers, swamps, marshes, wet grasslands and peatlands, oases, estuaries, deltas and tidal flats, near-shore marine areas, mangroves and coral reefs) and human-made sites (fish ponds, rice paddies, reservoirs, and salt pans).

Azzam Khan 5/20/12 5:04 PM

Comment [2]: Appendix 2 repeated.

MH: this is a necessary repetition

fundamental ecological functions of wetlands and their economic, cultural, and recreational value. The Ramsar Convention explicitly acknowledges the importance of sustainable trade of wetland products for the sustainable use and conservation of wetlands.

In its COP 10 resolution X.12 of 2008, Ramsar¹⁷ reaches out to the business world with a proposal for greater partnership with the private sector. The management of water resources and the trading of ecosystem benefits from wetlands is a major issue in considerations of partnerships between Ramsar and the private sector. However, Ramsar also recognizes the trade potential of products derived from the fauna and flora of wetlands. RAMSAR partners with UNCTAD's BioTrade Initiative to promote trade and sustainable use of biodiversity, and the two entities have embarked on a program to encourage member states and relevant partners to integrate issues of sustainable use of wetlands, and trade and investment in products from wetlands in their respective work programs.

5.4 Recommended reading

Ruiz 2008; UNCTAD 2007;

6 National factors enabling or hindering BioTrade

The national factors enabling or hindering BioTrade constitute a thematically broad and complex area. Enquiries among national BioTrade stakeholders routinely identify factors as negatively impacting on BioTrade that are more or less generic to all trade. This section focuses on those factors that more specifically affect BioTrade. The section is partially based on information contained in the country reports of Namibia, Nepal and Peru.

6.1 Good governance

Although the private sector can be a dynamic force driving BioTrade, it is required to operate according to the 'rules of the game' set by national governments. These rules can be either good for sustainability or bad. With respect to developing biodiversity businesses, current rules leave much room for improvement. Biodiversity is in decline due to strong perverse incentives to destroy the environment.

Lack of government commitments on mitigating climate change threatens to destroy a substantial portion of biodiversity. Predictions based on the best available science suggest that temperature rises are likely to wipe out up to 40 percent of plant and animal species by 2050 under current emission paths. Agreement from governments to limit carbon emissions is a prerequisite for biodiversity businesses to survive and prosper. The onus is on governments to set the rules for emissions reductions. This means principally pricing carbon adequately.

Aside from putting their countries on low carbon emission paths, governments have a central role to play in designing and enforcing national environmental policies. These include, for example, quotas for fishing, sustainable management regimes for forests, securing land tenure, agro-ecological research and extension, and protecting national parks. Government commitments have to be multiple, complex and long-term.

¹⁷ http://www.ramsar.org/pdf/res/key_res_x_12_e.pdf

The natural products sector is particularly reliant on effective government to ensure sustainability. As presented in section 4, BioTrade provides cash income for millions of rural people often living in poverty in marginal areas. Consumer demand has increased for natural ingredients for cosmetics, medicines and food, placing natural resources under stress. When these resources are in season, people desperate for an income rush to the forests and mountains to collect valuable leaves, roots and berries. As permit systems for collection rarely exist in developing countries, this leads to over-collection and depletion of the resource. For example, when diet preparation companies became interested in hoodia, a succulent plant from southern Africa, over-collection led to local devastation of the plant's populations.

Controlling the trade means setting up transparent and sustainable supply chains – a key role for government, as illustrated in Namibia. In Namibia, a strong export trade in natural products including marula oil, Kalahari melon seed oil and other endemic species has emerged employing many thousands of indigenous peoples. The government initially commissioned studies of plant resources and assessed their commercial potential. It subsequently provided the establishment and ongoing funding of a coordinating body made up to identify priority areas of action for the sector and then commit and leverage new resources. Having this type of 'planning platform' and ability to deploy budgets more strategically has increased the impact of scarce government resources and minimises the risk of failure of a product's development.

The Government of Namibia has thereby made the rules of the game clear for industry and communities to develop national biodiversity businesses. However, correcting the bigger market failure, namely climate change, is largely beyond their control and that of other developing countries. It is governments in developed and emerging economies whose actions on mitigation will determine the future 'supply' of biodiversity resources.

6.2 Infrastructure

Lack of infrastructure is a general impediment to development and it is occasionally mentioned as negatively affecting BioTrade. For instance, it was identified in Nepal as a very serious issue restricting access to habitats of medicinal and aromatic plants. The topography of Nepal consists of hilly and mountain areas, which have a mere 1.4 km roads per 100 km² area. Of course, infrastructure works can be a mixed blessing, where they lead to environmental destruction of habitats, such as the "classic" situation of new roads opening up areas of pristine forests for uncontrolled logging, human settlements and agriculture.

6.3 Community participation and empowerment

Support to local leadership. Markets for community-based enterprises and biodiversity-based local economies, while still relatively small, are growing. Success stories can be found in numerous sectors, including in sustainable forestry and fishing, organic agriculture, eco-tourism, and the production of cosmetics, medicines, fiber and other products. BioTrade provides rural livelihoods with opportunities for much needed employment and diversification of community incomes.

A GEF study on small-scale biodiversity businesses in Latin America has demonstrated the importance of empowerment of local communities through successful local leadership. It revealed that leaders who are competent innovators, communicators, bridge-builders, and systems thinkers are most successful. Effective leadership is often a consequence of revived traditions. In addition to strengthening confidence and self-

esteem, culturally-rooted traditions often allow the re-appearance of old production techniques which, when combined with new insights, produce products of higher value or encourage the revitalization of traditional forms of ecosystem management.

Community ownership. Successful BioTrade enterprises always possess an element of community participation and/or ownership. The level of community participation refers to the degree that community members engage in a project and how open and democratic the consultation and decision-making processes are. In a number of enterprise projects, community members do own the enterprise (most commonly) through an incorporated cooperative in which all members have equal rights and share equally in profits.

The efficacy of community ownership in achieving conservation and financial sustainability is debated controversially. However, it is beyond doubt, that ownership will be essential to ensure that the community remains engaged and committed to the objectives of the enterprise. In other cases, entrepreneurs have invested in local companies, which employ and train community members as managers. In all likelihood, a hybrid form of “community-owned” and “community-managed” structures may be the best path for external entrepreneurs and technical assistance groups to gradually transfer assets and expertise to a community.

Access to business services. Access to appropriate financing is a defining challenge for community-based enterprises during their growth. Conservative financiers see in biodiversity enterprises, no matter how progressive they may be, a largely informal, public environment with high risks and low returns. Only the most dedicated and expert investors are able and willing to enter under these circumstances. Lack of credit therefore emerges often as the most important market barrier to growth, and is further exacerbated by the common absence of bank subsidiaries in rural areas. Growing, small enterprises are often forced to take up loans in local markets at unfair terms and interest rates. Development and conservation donors are thus realizing that they now have an opportunity to begin to “smart-subsidize” global or local financiers who wish to invest in community-based biodiversity enterprises.

Empowering community-based businesses requires access to development services including financial management, computer literacy and other business skill training services. Regrettably, these are hardly ever provided by the public sector, a gap that has been filled by consulting firms, university departments, and to a lesser degree NGOs.

Marketing is a critical area of business development services of which labeling schemes and/or certification is at the core of the BioTrade sector. Increasingly, labeling schemes are becoming associated with landscape-level or bioregional branding strategies such as GIs for products including coffee, tea, upland rice, etc.

Access to information and technical services. Success in sustainable BioTrade depends on individual actions of hundreds of millions of rural families, whose decisions are shaped by the information, knowledge and technologies available to them. However, policies to bring down public deficits in many developing countries have led to the dismantling or reduction of rural extension systems and the introduction of fee-based schemes of the private sector. This has been portrayed as a positive development: Users can dictate, or at least influence, the type and quality of the services they buy. On the other hand, it has put advisory services beyond the reach of the poorest.

Many countries have recognized the need to reinvigorate agricultural extension or advisory services as a means of using agriculture as an engine of pro-poor growth;

reaching marginalized, poor, and female farmers; and addressing new challenges, such as environmental degradation and climate change. A study based on 294 studies worldwide, estimated the annual rates of return on extension investments were 79 percent. The call is on governments to use the ample experience with extension reform worldwide in order to identify the reform options most likely to make extension more demand-driven and responsive to the needs of all farmers, including women and those who are poor and marginalized. It is important to note, that sound agricultural policies supported by research are a precondition for agricultural extension to achieve its purpose.

The need for access of the rural poor to extension and business services is obvious from the Nepal case study. Nepal's BioTrade actors have no reliable data for estimation or assessment of many NTFPs. Even for very lucrative NTFPs such as Yarsagumba (*Cordyceps sinensis*), information related to potential and current harvest is lacking. Additionally, there is very limited knowledge of the propagation, cultivation and sustainable harvesting of many NTFPs at the community level. Gathered information tends to stay with the agencies that collected them. This results in a situation where the harvesters at the bottom level are unaware of the end market demands in terms of volume, quality and pricing. A centralized and dynamic resource database on NTFPs is needed that includes information from the cultivation stage to post-harvest management, processing and marketing, including their potential and prices in the domestic and global markets.

The importance of national information services in the public domain can hardly be overstated, in terms of their essential function in informing a variety of BioTrade issues and policies, spanning from IK documentation, to the documentation of species and product attributes, to IPR litigation and the overcoming of trade barriers. Refer to section 7.2.1 on the NFR and to section 7.3 on the ABS international regime for a more detailed appreciation of information services in the context of BioTrade.

Information services also relate to assisting with the development of local capacity for greater value-added processing. For example, the Nepal study points out that of the 161 NTFP species commercially traded from Nepal, only a few products are exported with value-added processing, and most of this is limited to simple cleaning, drying and, in very few cases, grading.

6.4 Security of tenure over land and resource rights

Natural habitats are often an open-access resource. This has its advantages in that the potential benefits of BioTrade are accessible to the poor. For example, coastal and reef fisheries are of great importance to poor communities as they can be exploited by people of all ages and abilities. The trade also has low barriers to entry in that little or no capital investment is required. Similarly, the wild meat trade does not discriminate against the poor. In fact in many respects it positively favors the poor.

The disadvantage of open-access resources, however, is the inability to exclude outsiders. Because of low entry barriers, refugees in Tanzania are able to penetrate the bushmeat trade as hunters, middlemen and traders. In the Asian marine aquarium trade, the majority of collectors in Indonesia and the Philippines are migrants who may travel long distances in search of harvesting opportunities. Owing to insecure resource tenure, rattan in Equatorial Guinea is harvested indiscriminately by collectors external to the communities with no consideration for sustainable management.

There is little doubt that many "outsiders" are also poor people in desperate search of a

living. However, without secure ownership or exclusive access rights, there is little incentive for local people to invest in the long term sustainability of natural resources—far better to exploit it while it is there and before others do the same. This leads to classic “boom and bust” patterns of development with resources being rapidly depleted in one area and then harvest and trade moving on elsewhere. This not only has implications for trade-related incomes in the areas where stocks are depleted but also for subsistence users.

Rural people are frequently affected by the lack of security in terms of a title to the agricultural land they manage, thus diminishing their incentives and ability to choose production practices with long-term payoffs. Without such incentives, farmers often focus on meeting short-term needs, and intensive cultivation in conditions of uncertain land tenure are resulting in the degradation of agricultural soils and water resources.

6.5 Recommended reading

Alston *et al.* 1998; Andersen 2008; Andersen and Winge 2008; ANSAB 2009; GEF 2006; Gurung 2010; ICIMOD 2010; IUCN 2009; Roe 2008; Swanson 2008; UN 2009;

7 International factors enabling or hindering BioTrade

7.1 Trade agreements under the WTO

Internationally recognized trade rules are essential for BioTrade to take place in an environment of fair competition, which at the same time guarantees that consumers receive products that are safe for consumption and have been produced according to principles of sustainability. Nonetheless, there is a perception that quality standards, quarantine restrictions and other requirements, in particular private quality standards, increasingly imposed by consumer countries can negatively affect BioTrade (and trade in general), as such requirements can be difficult or impossible to be met under insufficient capacity for quality management and deficient regulatory frameworks that often prevail in poor countries. Trade rules and the standards they imply are thus seen ambiguously as the indispensable “rules of the game” of international trade as well as “technical barriers” that take the place of tariffs that are increasingly being dismantled.

This section describes legal frameworks under the WTO, which provide a discussion and negotiation space for member countries to establish the rules under which trade (including BioTrade) should take place, in response to development goals and in observance of widely acknowledged international standards, such as those regulating food safety and animal and plant health.

Well-designed trade rules will be based on the principles that they be proportionate, science-based and non-discriminatory, as well as based on transparent and independent safety and risk assessments. Safety cannot be subordinated to trade interests, but markets must not be distorted by uneven application of safety standards.

At the same time, demonstrating the ability to comply with both public and private standards is very important in building a reputation for integrity on food safety at company and country level. This is often difficult to quantify but is well illustrated by the example of the damage done by food scandals.

7.1.1 The Technical Barriers to Trade Agreement (TBT)

Technical regulations and standards for imported produce can be important, for a range

of reasons, including compliance with internationally agreed environmental standards, product safety (in particular food safety), national security as well as appropriate consumer information. But they vary from country to country, and complying with many different standards makes life difficult for producers and exporters. Also, there is a temptation for importing countries to use standards as a protection against unwanted competition from production in exporting countries.

The Technical Barriers to Trade Agreement (TBT) tries to ensure that regulations, standards, testing and certification procedures do not create unnecessary obstacles. It recognizes countries' rights to adopt the standards they consider appropriate — for example, for human, animal or plant life or health, for the protection of the environment or to meet other consumer interests. But it encourages governments and the private sector to apply international standards, to make life easier for manufacturers and exporters. The TBT also sets out a code of good practice for the public and the private sectors to prepare, adopt and apply voluntary standards. Over 200 standards-setting bodies apply the code.

The agreement discourages any methods that would give domestically produced goods an unfair advantage. The agreement also encourages countries to recognize each other's procedures for assessing whether a product conforms. Without recognition, products might have to be tested twice, first by the exporting country and then by the importing country. Under the WTO member governments are required to establish national enquiry points so as to keep each other informed— around 900 new or changed regulations are notified each year.

The TBT Agreement covers all technical regulations, voluntary standards and the procedures to ensure that these are met, except when these are sanitary or phytosanitary measures as defined by the SPS Agreement, which will be covered in the next section.

TBT measures can cover any product, from car safety and energy-saving devices, to the shape of food cartons, pharmaceutical restrictions, and the labelling of cigarettes, and therefore have largely no relevance for BioTrade. However, for food, most labelling requirements, information on nutrition and quality and packaging regulations are generally not considered to be sanitary or phytosanitary measures and hence are normally subject to the TBT Agreement. On the other hand, regulations, which address the microbiological contamination of food, or set allowable levels of pesticide or veterinary drug residues, or identify permitted food additives, fall under the SPS Agreement.

The two agreements share some common elements. These include basic obligations not to discriminate. They both require governments to notify proposed measures in advance. Both require governments to set up information offices (“Enquiry Points”). Nonetheless, many of the substantive rules are different. For example, both agreements encourage governments to use international standards. However, under the SPS Agreement, if a government wants to set its own standards for food safety or to protect animal and plant health, it has to base this on a scientific assessment of the potential health risks. In contrast, under the TBT Agreement, governments can use other justifications, such as fundamental technological reasons or geographical factors, to set their own standards.

Figure 2 provides some guidance for deciding whether a measure falls under TBT or SPS. Further examples are collated in Table 9.

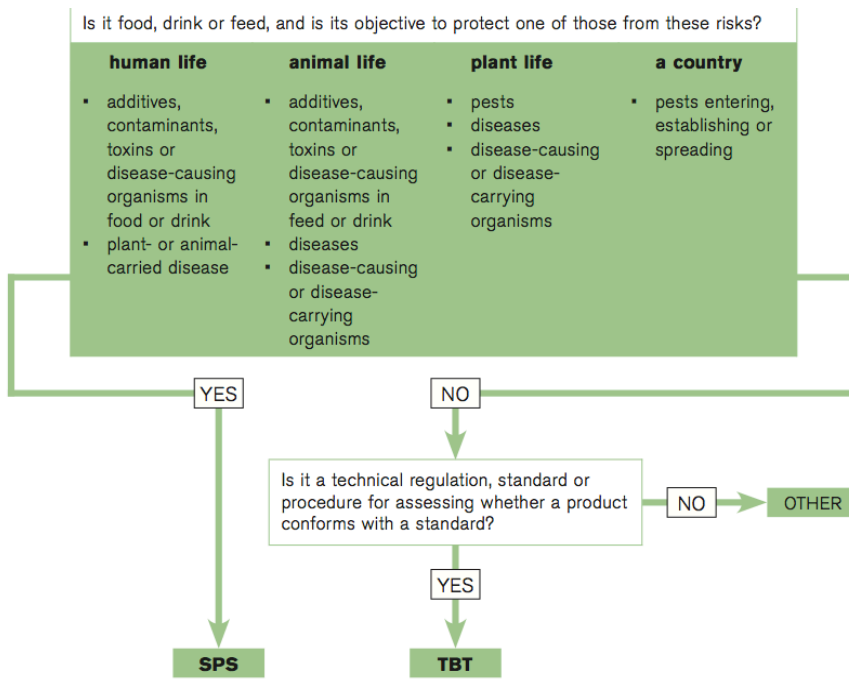


Figure 2: SPS or TBT? Which agreement does a measure come under? (source: WTO 2010)

Table 9: Comparison of TBT and SPS measures (adapted from WTO 2010)

Issue	SPS measures	TBT measures
Fertilizer use	Regulation on permitted fertilizer residue in food and animal feed	Specifications to ensure fertilizer works effectively; Specifications to protect farmers from possible harm from handling fertilizer
Imported fruit	Regulation on treatment of imported fruit to prevent pests spreading	Regulation on quality, grading and labeling of imported fruit
Food labeling	Regulation on permitted food safety: health warnings, use, dosage in food labeling	Regulation on size, construction/structure, safe handling in food labeling

7.1.2 The Sanitary and Phytosanitary Agreement

Because sanitary and phytosanitary measures can so effectively restrict trade, WTO member governments established the WTO Sanitary and Phytosanitary Agreement (SPS). It aims to create a multilateral system with clear rules how sanitary and phytosanitary measures can be used and enforced in member countries. The agreement seeks to foster a harmonized global system of standards that can be used in an objective manner and are not disguised barriers to trade.

Box 7: SPS terminology

“Sanitary” refers to human and animal health, including food safety, and “phytosanitary” means plant health. For the purposes of the SPS Agreement, sanitary and phytosanitary measures are defined as any measures applied:

- to protect human or animal life from risks arising from additives, contaminants, toxins or disease-causing organisms in their food or beverages;
- to protect human life from plant- or animal- carried diseases;
- to protect animal or plant life from pests, diseases, or disease-causing organisms;
- to prevent or limit other damage to a country from the entry, establishment or spread of pests.

SPS allows countries to set their own standards, provided these are based on science, and applied only to the extent necessary to protect human, animal or plant life or health. They also should not arbitrarily or unjustifiably discriminate between countries where identical or similar conditions prevail.

Member countries are encouraged to use international standards, guidelines and recommendations for setting standards, a process known as “harmonization”. For example, relevant international standards recognized under SPS include (1) the Codex Alimentarius¹⁸ for food safety, (2) the standards of the World Organization for Animal Health¹⁹, and the International Plant Protection Convention²⁰ aimed at preventing the introduction and spread of plant pests.

When applicable standards exist, they are unlikely to be challenged legally in a WTO dispute. However, members may use measures, which result in higher standards if there is scientific justification. They can also set higher standards based on appropriate

¹⁸ (http://www.codexalimentarius.net/web/index_en.jsp)

¹⁹ http://www.oie.int/eng/en_index.htm

²⁰ <https://www.ippc.int/>

assessment of risks so long as the approach is consistent, not arbitrary. And they can to some extent apply the “precautionary principle”, a kind of “safety first” approach to deal with scientific uncertainty.

However, the SPS contains some ‘checks and balances’ that try to balance the need for effective sanitary and phytosanitary measures on the one hand and the need to facilitate international trade on the other. For instance, an exporting country, which feels that a specific sanitary measure is constraining or has the potential to constrain its exports, can request an importing country to provide the rationale behind a specific SPS measure.

The SPS also obliges the importing country, in cases where there is insufficient scientific evidence to allow importation, to seek additional information necessary for it to make a more objective risk assessment. This is likely to take considerable amounts of time at the expense of the exporting country, particularly in the case of relatively new and unknown BioTrade products, such as those derived from underutilized crops, or traditional foods, that have been known to be subjected to higher sanitary and phytosanitary scrutiny within the realms of the SPS. This has had negative implications for trade, where such higher measures create delays or even disrupt supply chains.

Unfortunately, many countries face a number of SPS implementation problems, which need to be taken into account to a greater extent in BioTrade capacity-building and international negotiations over standards and regulations. Many countries are unable to participate effectively in international standard-setting and public and private sectors need technical and financial assistance in implementing the requirements of the agreements and support in compliance and certification.

For example, it has been argued that some elements of EU private quality standards are very costly or otherwise inaccessible simply as a consequence of translating EU-centric standards into the very different developing country production environment. Some have called for the urgent establishment of mechanisms that allow for flexibility so that private standards can be adapted to local conditions (see [Box 8](#)).

Box 8: Two cases that illustrate the need for adapting externally imposed private quality standards to the peculiarities of developing country production environments.

GAP bananas: Private standards were first brought to the World Trade Organization (WTO) through concerns raised by St. Vincent and the Grenadines at the SPS Committee, in June 2005. These countries argued that the EurepGAP (now GlobalGAP) pesticide and certification requirements being asked mainly by large European retailers for the importation of bananas exceeded those established by the Codex Alimentarius. Whilst these concerns were supported by several other developing countries Members, who shared similar concerns regarding an array of private standards on SPS, the European Communities replied that EurepGAP standards were not official EU requirements, and rather standards applied between private parties in their commercial transactions. This case shows that private standards can be more restrictive than official import requirements, and thus act as additional barriers to market access. On the other hand, some Members have taken the view that standards set by the private sector can help suppliers to improve the quality of their products and gain and maintain access to high-quality markets. Many WTO member countries have expressed concerns regarding the costs of complying with private standards, and the additional costs of certification, sometimes for multiple sets of standards for different buyers, which may far exceed the capacities of small-scale producers.

Organic quinoa: Quinoa, an indigenous starchy chenopod grain from highland Bolivia, promoted for specific dietetic purposes, has had in recent years phenomenal success on international markets, particularly (see [Table 4](#)) as an organically certified product under various private and public labels, notably the EU organic standard. Invariably, these standards only allow the application of organic fertilizers, effectively restricting fertilization to locally available animal dung. Owing to the scarcity of animal dung in the Altiplano (due to low animal densities), the sharp increase of quinoa production in recent years has only been sustained by soil mining (the consistent net extraction of nutrients from the soil) and shortened fallow periods, leading to soil degradation, erosion and the expansion of quinoa to areas unsuited for its cultivation, such as steep, and erosion-prone areas. The decline in soil fertility induced by organically certified quinoa

Azzam Khan 6/21/12 1:18 PM

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cropping has been observed repeatedly, but commercially motivated demands that the "purity" of quinoa production be maintained and the quality standards of EU importers be met, have prevented a rational, science-based modification of fertilization standards (including the option of the use of mineral fertilizers), that takes into account the radically different soil conditions in the Altiplano from those in Europe, under which the standard has been developed. In this case, the mistaken practice of a sustainability standard leads, unintentionally but *de facto*, to an utterly unsustainable outcome.

7.1.3 Generalized System of Preferences

The Generalized System of Preferences (GSP) is a system of exemption from the more general rules of the World Trade Organization (WTO). The exemption follows the most favored nation principle (MFN) that obliges WTO member countries to treat the imports of all other WTO member countries no worse than they treat the imports of their "most favored" trading partner, e.g. by imposing equal tariffs on them.

GSP was created in response to concerns that MFN was a disincentive for richer countries to reduce and eliminate tariffs and other trade restrictions with enough speed to benefit developing countries. Under GSP schemes of preference-giving countries, selected products from developing countries are granted reduced or zero tariff rates over the MFN rates (without also doing so for rich countries). The least developed countries receive special and preferential treatment for a wider coverage of products and deeper tariff cuts.

From the perspective of developing countries, GSP programs have been a mixed success. On one hand, most rich countries have complied with the obligation to generalize their programs by offering benefits to a large number of beneficiaries, generally including nearly every non-OECD member state. On the other hand, most GSP programs are not completely generalized with respect to products, and more significantly, do not necessarily cover products of greatest export interest to low-income developing countries, namely simple manufactured goods and agricultural products. This is to protect less competitive industries and agriculture in preference-giving countries.

Even in the face of such limitations, GSP has benefited developing countries, particularly the "richer developing" countries while providing much less assistance to the world's least developed countries. However, liberalization of trade policy has also been occurring on the agricultural front, and WTO rules have in recent years been extended to cover both textiles and agricultural products. Where under new WTO rules import tariffs and quotas for agricultural products still apply, they mostly do not affect products from native biodiversity for these are rarely substitutes for the products that preference-giving countries seek to protect. Therefore, it is fair to conclude that the GSP contributes positively to an enabling international environment for BioTrade in so far as it frequently exempts BioTrade products from customs duties.

7.1.4 Recommended reading

Fernandes 2009; Graffham 2009; Shakya 2009; Webb 2009; WTP 1998; WTO 2010;

7.2 Food safety regulations

Consumer worries about food safety, concerns about the increasing number of chemicals in food and the environment as well as the need to harmonize legislation, are among the key factors that have led to increased scrutiny of food and food ingredients in consumer countries, especially for imports. All food-importing countries seek to protect the health of consumers through regulations addressing market authorization, the use of ingredients, labeling requirements, etc., all of which act as market access barriers for

BioTrade exporters.

The three regulations presented in the following sections provide just a small sample of the wide range of relevant regulations, albeit these have been among those more prominently figuring in the headlines. They include the EU Novel Food Regulation affecting foods seen as “novel” from a EU perspective (although they are mostly traditional in the countries of origin); the REACH system of the EU, which concerns the use of chemicals, and the system of GRAS exemptions in the US concerning food ingredients.

The three cases share several commonalities: the increasing burden of proof that is placed on the private sector to demonstrate food safety, increasing costs and difficulties in substantiating claims in a manner acceptable to regulatory bodies, the wide-spread unawareness of the very existence of such barriers on the part of the private sector and government entities (often including trade promotion bodies), and the need for greater capacity building and standards/ policy setting in producer countries. While food safety regulations undoubtedly represent barriers, especially for SMEs, they should also be viewed as measures from which developing countries can ultimately benefit in terms of raising production standards and providing models and standards for improving consumer protection and human health within source countries.

7.2.1 Novel Food Regulation of the European Union

The current EU Novel Food Regulation²¹ (NFR) requires a formal authorization and stringent food safety assessment prior to introduction into the EU market of any foods that do not have a significant consumption in the EU pre-1997. The NFR was introduced primarily to control genetically modified plants but its scope includes all “novel” foods, including those traditional in non-EU countries. Both scientific and administrative demands to obtain market authorization for traditional foods are considerable. Although GMOs are now subject to separate, specific legislation, no commensurate changes have been made to requirements for scientific evidence of safety of non-GMO “novel” foods. Thus, traditional foods with a long history of use outside the EU are currently subject to criteria originally designed to control GMOs and, almost without exception, are denied access to the EU²².

The NFR has emerged as a serious, albeit unintended, non-tariff trade barrier to imports of traditional foods from the developing world into the EU. The fact that many of the foods challenged by the NFR are legally available in Canada, Japan, Switzerland and USA suggests that regulations in these countries are less stringent than the European NFR.

In 2008, the EU Commission published a proposal for a revised NFR that introduces a modified, and presumably less burdensome application procedure for foods which have

²¹ Regulation (EC) No. 258/97 of the European Parliament and of the council of 27 January 1997 concerning novel foods and food ingredients. <http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1997/R/01997R0258-20040418-en.pdf>

²² The EU maintains a searchable database, the Novel Food Catalogue, that provides the status of many edible species under the NFR, accessible under: <http://ec.europa.eu/food/food/biotechnology/novelfood/nfnetweb/index.cfm> (accessed 20 December 2008)

not been traditionally sold in the EU but which have a safe history of use in non-EU countries. The proposal continues to be discussed within and between the Parliament, Commission and the EU member states.

Organizations promoting trade in biodiversity products and aid donors have expressed concerns that the NFR is in conflict with their objectives, especially with policies aimed at investment in the sustainable use of biological resources in support of poverty alleviation. UNCTAD has spearheaded lobbying efforts to induce EU lawmakers to bring food safety evidence requirements of the revised NFR in line with other EU obligations in international agreements, particularly those in relation with the WTO SPS agreements.

Food safety concerns in regard of exotic traditional foods will not go away. Even if the evidence requirements of the NFR were made proportionate to actual food risks, exporters will still require nutritional, compositional and other documentation. However, scientific documentation of the innocuousness of many traditional exotic foods even if they have a long history of safe use is typically non-existent or deemed insufficient by regulators, owing to the lack of peer-reviewed research publications, or lack of data from certified laboratories. Exporting countries and donors must address this gap of knowledge in project design and product development and trade promotion activities. Too many promotional activities, have been going on with an almost exclusive supply-oriented emphasis on production, whereas little if any investment of the public sector was aimed at food safety issues.

There is a need to develop dossiers for “exportable” traditional foods, which compile the available knowledge and identify gaps. Issues that need to be addressed include history of use, compositional changes due to post-harvest conditions and processing, evidence for the presence or absence of anti-nutritional or toxic factors, as well as nutritional assessments (food intake levels considered safe).

Box 9: The NFR as a technical trade barrier: The NFR calls for anyone wishing to place a food product on the EU market to first evaluate whether the food was used prior 1997 and to present evidence to support the case, in itself not a trivial or easy task. If the food in question can be shown to have been used within the EU before 15 May 1997, it is viewed as not novel, and it may be placed on the market. An assessment under the NFR is then not required. If market presence for the food cannot be demonstrated for the time before 15 May 1997, it is viewed as novel, and an assessment of the food’s safety under the NFR is required.

Once submitted to the relevant member state authority, the application takes its course in a process in which the commission, all member states, and advisory bodies intervene at various stages and iterations. Essentially, the competent national food assessment body will issue an initial safety assessment report. Member states are then allowed to raise any reasoned objections to the marketing of the product. Eventually, the applicant may be required to present specific data with regard to food composition, suggested intake levels, toxicological assessments and allergenic potential, to support the application. It is common that such evidence is questioned by the EU and further additional food safety evidence is required.

The average time taken from acceptance of an application to market authorization by the EU Commission has taken an average of 39 months, and investments per product in the order of US\$ 300,000-500,000 to satisfy EU food safety evidence requirements are not unusual.

Market authorization of Baobab fruit pulp under the NFR: In 2008, the EU Commission authorized the NFR application for the dried fruit pulp of baobab on the EU market, submitted two years earlier by Phytotrade, a Southern African consortium of small producer groups, private sector companies, non-governmental organizations, research and government organizations. Baobab (*Adansonia digitata*) is a large tree native to Southern Africa, which produces large fruits that dry out during maturity and contain a powdery white pulp high in minerals, vitamin C and dietary fiber. Conveniently extracted and traded at a wholesale price of approximately €35/kg the dried pulp has potential for use as a functional ingredient in smoothies, cereal bars, confectionary and related products. A market study on baobab (Gruenwald and Galizia 2005) suggested a multi-million dollar market, with benefits accruing to many thousands of poor rural producers, who gather the fruits and sell them to local processors.

In their application to the UK's national authority, the Food Standards Agency (FSA)²³, Phytotrade presented an extensive literature survey on baobab, including evidence on the widespread use of baobab in Africa and Asia, compositional and toxicological data, as well as the results of laboratory studies commissioned by Phytotrade to verify the freedom of baobab pulp of particular toxins. The initial opinion by an independent panel of scientists appointed by FSA noted the absence of 'classical toxicological analyses' in the application, but accepted Phytotrade's reasoning that the family Malvaceae (to which baobab belongs) and the related Bombacaceae are not known for the presence of toxic or allergenic constituents. However, the panel recommended that Phytotrade should carry out analyses for aflatoxin, a request with which Phytotrade complied. The data produced by the applicant were within EU limits for fried fruit and the panel accepted reassurances by Phytotrade that it would carry out routine quality control tests for aflatoxins. The application was then forwarded to the EU Commission and subsequently distributed to all member states which did not raise food safety concerns. In June 2008, the Commission authorized baobab dried pulp as a Novel Food.

Table 10: Promising BioTrade food products challenged by NFR

Common and scientific name	Attributes of commercial interest	Product application under NFR;	Food safety assessment under NFR	Authorization status, year of EU decision
Nangai nuts (<i>Canarium</i> spp.)	Almond-sized kernels for gourmet market	Seed kernels;	Submitted compositional, allergenicity and toxicology data deemed incomplete;	Application refused, 2000
Stevia (<i>Stevia rebaudiana</i>)	Non-caloric sweetener	Leaves	Toxicity data deemed unsatisfactory to dispel food safety concerns; insufficient standardization of commercial product	Application refused, 2000
Maca (<i>Lepidium meyenii</i>)	Traditional tonic, Mounting evidence for pharmacological effects on endurance	No application	n.a.	NFR status not clear until 2007; some EU member states prohibiting commercialization, since 2008 listed in NFC as not subjected to NFR
Noni (<i>Morinda citrifolia</i>)	Health-promoting attributes	Fruit Juice	In 2002, favorable opinion issued by EU Scientific Committee, based on assessment of extensive toxicity and allergenicity data.	Authorized as novel food ingredient in 2003
Baobab (<i>Adansonia digitata</i>)	Dried fruit pulp has high contents of vitamin C, iron. Potential as functional ingredient in food and beverages	Dried fruit pulp	Extensive literature survey of history of safe use and composition. Submitted new data on microbiological contamination, specific toxins.	Authorized as novel food ingredient in 2008

²³ Baobab Dried Fruit Pulp – An application for Novel Foods Approval in the EU as a food ingredient. URL: <http://www.food.gov.uk/multimedia/pdfs/baobabapplicationfinal.pdf> (accessed 15 December 2008).

Allanblackia (<i>Allanblackia</i> <i>spp</i>)	Unique fatty acid composition of seed oil; use margarines	Seed oil	Compositional data, in particular fatty acids; Oil stability; Bacterial genotoxicity tests; subchronic toxicity in rats;	Authorized as novel food ingredient in 2008
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7.2.2 REACH

REACH stands for “Registration, Evaluation, Authorization and Restriction of Chemicals”. This is a EU Regulation that addresses the production and use of chemical substances, and their potential impacts on both human health and the environment. REACH entered into force in 2007, with a phased implementation over the next decade. When REACH is fully in force, it will require all companies manufacturing or importing chemical substances into the European Union in quantities beyond certain thresholds to register these substances with a new European Chemicals Agency, which will manage the technical, scientific and administrative aspects of the REACH system²⁴.

REACH was conceived out of concerns that current legislation regarding the safety (effects on human health and the environment) of chemicals is inadequate. The REACH system will replace over 40 existing EU directives with a single, integrated regulatory system. REACH requires companies that produce and import chemicals to assess the risks arising from their use and to take the necessary measures to manage any risk they identify. Importantly, this reverses the burden of proof from public authorities to industry for ensuring the safety of chemicals on the market.

Under current EU legislation chemicals are either defined as “existing” or “new”. The EU Commission is particularly concerned that the knowledge and information about the safety of the existing chemicals is inadequate and, with expensive and slow procedures for the registration of new chemicals, the EU Commission claims that the EU chemicals industry is finding more uses for the over 150,000 existing chemicals, which is increasing the risks to human health and the environment.

REACH is designed to complement EU legislation for cosmetics and pharmaceuticals. Some of the chemicals used in these products will need to be registered, others will not. If the chemical is not exempt from REACH then it will need to be registered according to the REACH regulations.

BioTrade products from developing countries are not exempt from REACH legislation. For example, natural ingredients are also chemicals, although REACH is particularly aimed at the existing chemicals. Therefore the majority of “natural ingredients” do not require registration. This is not to suggest that natural ingredients can be assumed to be safe. Natural ingredients can also be dangerous chemicals and where natural ingredients are classified as dangerous then they will need to be registered under REACH.

One REACH provision exempts “substances occurring in nature if they are not chemically modified during their manufacturing” thus apparently exempting most BioTrade products from registration, provided that they are not dangerous. Thus plant materials and preparations from plants using non-hazardous solvents could be included here. REACH lists a range of natural ingredients including common plant oils that are produced in the EU, suggesting that other vegetable oils, if not known to be a dangerous

²⁴ http://ec.europa.eu/enterprise/sectors/chemicals/reach/index_en.htm

substance (very few are), would also be exempt from registration under REACH. However, this does not exempt these substances from the requirements of other EU legislation such as cosmetic, pharmaceutical and food.

One category of chemical substance of importance to BioTrade is essential oils, which are currently required to be registered under REACH. Essential oil importers and manufacturers have been lobbying to have essential oils exempted from registration under REACH, arguing that essential oils are biodiversity products consisting of complex chemical substances, to which REACH considerations cannot be validly applied.

Surveys of value chain actors involved in essential oil trade, in particular amongst exporters, have shown low or nil awareness of REACH. Enterprises affected by REACH will find difficulties in being able to obtain the test data required for registration, owing to the costs involved (€10,000 to test the low volume substances), and the requirement that test data be obtained from GLP-certified laboratories. There is also a need for exporters to partner up with EU entities, as only these are permitted to submit registrations. It seems advisable that suppliers explore REACH implications of their business with customers in the EU, in order to accommodate insights in their product design market access strategies.

7.2.3 GRAS

Generally recognized as safe (GRAS) is a designation of the US Food and Drug Administration (FDA) meaning that a chemical or a food ingredient (a substance added to food) is considered safe and so is exempted from food additive tolerance requirements under the Federal Food, Drug, and Cosmetic Act.

In 1958 as a cut-off date, the FDA established a list of 700 food substances that were exempt from the then new requirement that manufacturers test food additives before putting them on the market. For a substance to be GRAS, the scientific data and information about the use of a substance must be widely known and there must be a consensus among qualified experts that those data and information establish that the substance is safe under the conditions of its intended use.

The proponent of the exemption has the burden of proving that the use of the substance is "generally recognized" as safe. To establish such recognition, the proponent must show that there is a consensus of expert opinion regarding the safety of the use of the substance. The existence of a severe conflict among experts regarding the safety of a substance precludes a finding of general recognition.

When a use of a substance does not qualify for the GRAS exemption, that use of the substance is subject to the premarket approval mandated by the Federal Food, Drug and Cosmetic Act. In this case, the FDA can take enforcement action to stop distribution of the food substance and foods containing it on the grounds that such foods are or contain an unlawful food additive.

There is also an additional way that a GRAS exemption can be made. For a substance used in food before 1958, a GRAS exemption can be made through experience based on common use in food. Exemptions based on common use in food require a substantial history of consumption in food by a significant number of consumers.

A recent GRAS notification for baobab dried fruit pulp successfully demonstrated safety to the FDA by utilizing detailed analyses of the nutritional and phytochemical components in baobab.

7.2.4 Recommended reading

Jones 2005; EFEO 2005; FDA 2009; Gruenwald and Galizia 2005; Hermann 2009.

7.3 Access and benefit-sharing

Progress toward the third objective of the CBD, which is the “fair and equitable sharing of benefits arising from genetic resources” has been disappointing, particularly from a developing country perspective. In particular, the following issues have featured prominently in discussions about the need for an international regime for access and benefit-sharing (ABS):

- Frustration about limited economic and non-monetary benefits derived from bioprospecting projects and from the application of existing national or regional ABS frameworks.
- Cases of illegal access or misappropriation in Latin America, Asia, and Africa. Difficulties in finding cost-effective legal solutions within the framework of national ABS legislation or industrial property law have provided a rationale for undertaking modifications to the text or operation of Intellectual Property Rights (IPR), particularly patents, which so far have proven to be one of the main causes of complaints being filed for misappropriation or “biopiracy”.
- It has mostly been developing countries that have issued regulations on ABS, although the CBD requires all Parties to take measures to ensure fair and equitable benefit sharing. Developed countries where pharmaceutical, biotechnological and agricultural companies usually have their headquarters have not put in place corresponding regulations in compliance with the CBD and other legally binding international obligations. The absence of so-called “user country measures” has been suggested as one of the causes of high transaction costs and the highly controlling nature of current access laws, particularly in the case of transboundary BioTrade.

Fortunately, an international regime for access and benefit-sharing (ABS), has been adopted during COP 10 in late 2010, bringing several years of negotiations between the Parties to the CBD to a conclusion. This so-called Nagoya protocol is hoped to generate greater benefits to source countries and communities from the economic gains arising from exploitation of their biodiversity, while facilitating access to genetic resources by industry. The following provides an overview on the accord’s most salient provisions:

- Article 5 urges Parties to take legislative, administrative or policy measures to ensure that benefits arising from the utilization of genetic resources and indigenous knowledge are shared in a fair and equitable way, in particular –where applicable- with indigenous and local communities.
- Article 6 stipulates the conditions of access to genetic resources such as prior informed consent including the approval –where applicable- of local communities, the need for legal certainty, transparency, fairness, cost-effectiveness and clear procedures in facilitating access as well as the designation of a national authority dealing with access applications.
- Article 8 obliges Parties to promote and encourage research, which contributes to the sustainable use of biodiversity (e.g. through simplified access measures for non-commercial purposes). This article also deals with emergency situations that threaten human, animal or plant health. It states that “parties may take into consideration the need for expeditious access to genetic resources and expeditious fair and equitable

sharing of benefits, including access to affordable treatments by those in need, especially in developing countries.” This provision would be directly relevant to ongoing negotiations at the World Health Organization, where governments are debating whether countries should be obliged to share genetic material relating to human pathogens (such as the avian flu), and whether they can fairly expect to receive benefits for doing so.

- Article 9 urges Parties to direct benefits arising from the utilization of genetic resources towards the conservation and sustainable use of biological diversity.
- Articles 10 calls upon Parties to “consider a global multilateral benefit-sharing mechanism” to address “transboundary situations” and “situations for which it is not possible to grant or obtain prior informed consent.” This would –according to article 11- apply in instances where the same genetic resources are found *in situ* within the territory of more than one country, or where the same traditional knowledge is shared by one or more local communities in several countries. Article 10 could in theory apply to the use of genetic resources obtained *ex situ* or prior to the coming into force of the CBD.
- Article 13 calls for the designation of national competent authorities on ABS.
- Articles 15, 16 and 17 spell out mechanisms for the compliance with domestic legislation on ABS for genetic resources and indigenous knowledge. Parties are obliged to “take appropriate, effective and proportionate measures to address situations of non-compliance” and to “establish one or more effective checkpoints having functions relevant to the utilization of genetic resources” that “would collect or receive as appropriate, relevant information.” However, the text is unspecific and silent on “disclosure requirements” in patent applications (a requirement for patent applicants to disclose the use of any traditional knowledge or genetic resources used in their invention), which have been demanded by many governments and experts (including some developed ones, which now support a similar requirement in talks at the World Trade Organization).

The ABS protocol has been critiqued for using language too ambiguous for a number of core issues that have been disputed over the years. Elimination of disputed provisions and overly general statements introduced during the final phase of the negotiations veil disagreements and leave considerable room for interpretation. Despite lacking legal certainty, the adoption of the protocol has been welcomed, in the hope that further progress be achieved through domestic implementation and future review processes.

Several provisions of the Protocol address issues covered in conventions other than the CBD, and are discussed in other negotiating fora, such as the WTO-TRIPS, WIPO and UPOV. This thematic overlap implies much scope for potentially conflicting and/or synergetic policies and obligations across conventions. A brief (and simplified) account of the consultations with UPOV prior to the adoption of the protocol, may serve to illustrate this. UPOV expressed its keen interest that the international regime on ABS be mutually supportive with PBR, pointing out the inherent benefit-sharing principles of the UPOV convention (see section 7.4.1). UPOV expressed concerns that ABS measures might introduce barriers to breeding. For example, with respect to the much discussed disclosure of origin, UPOV advised that, whilst encouraging its use, it could not accept this as an additional requirement for the protection of varieties²⁵. With regard to benefit-

²⁵ Note that with regard to the WTO discussions on disclosure, these take place in the context of the patent system and would not affect PBR protection

sharing, UPOV observed that UPOV would be concerned if any mechanisms to claim the sharing of revenues were to impose additional administrative burden when varieties are used for further breeding. Indeed, such an obligation for benefit sharing would be incompatible with the UPOV's principle of the breeder's exemption (for an explanation refer to section 7.4.1).

Calls for mutual supportiveness between the CBD, WTO, WIPO and UPOV regimes can be read as implying the need to make compatible multiple regimes with very different objectives, approaches and values demanding and claiming legal protection. The effective implementation of the ABS Protocol demands input and collaboration from a range of organizations and fora to ensure that all cross-sectoral issues are given due consideration.

Box 10: Certificate of compliance. One element ABS negotiations have focused on in order to respond to the call for user country measures, and to contribute to solving problems related to the traceability of genetic resources, is the development of some form of certificate of origin/source/ legal provenance, also called a "certificate of compliance." This internationally recognized certificate would serve as evidence that the genetic resource in question has been obtained, accessed and used in accordance with prior informed consent and mutually agreed terms. The idea of the certificate is to prevent or minimize problems generated by the existence of two different jurisdictions for ABS arrangements—that of the place where the material is collected and that of the place where it is used. The existence of an internationally recognized document would make it possible to check the legality of access at the place where the activity (patent, product approval, etc.) generates value, and to discover the subsequent use of the resources and corresponding benefit sharing.

At the same time, this supposedly would favor the creation of simpler access systems in provider countries, because existing control mechanisms would be applied, via the certificate, in the later stages of research and development, thus helping to make the regulation of access to genetic resources more flexible. In this way, monitoring and regulation would be less strict during the access phase and stricter during the research and development phase, where control or check points would be established. A CBD-appointed expert group advised that the basic role of any certificate system would be to provide evidence of compliance with national ABS legislation. This could be achieved by a system of national certificates with standard features to allow for their international recognition. The certificate could be required for presentation in, *inter alia*, patent and in general IP applications, and could be integrated into the existing system of requirements for disclosure of information in the patent system. Compliance with disclosure requirements would be facilitated where an internationally recognized certificate could act as evidence of conformity with national and international law.

However, the certificate, if used as an export certificate in the international trade of genetic resources may raise trade issues in the context of the relevant rules of the WTO regarding non-discrimination (the most favored nation principle and the national treatment principle) as well as the appropriate measures contained in the Agreement on Technical Barriers to Trade (TBT), which governs the elaboration of technical regulations, standards and conformity assessment procedures in ways that do not create unnecessary obstacles to international trade.

7.3.1 Recommended reading

Cabrera 2010; CBD 2007; ICTSD 2010; SGRP 2010;

7.4 Intellectual property rights

7.4.1 Plant variety protection under UPOV

The International Union for the Protection of new Varieties of Plants (UPOV) came into being in 1961 and as of December 8, 2011, had 70 member countries. The UPOV Convention provides an internationally recognized system of plant variety protection (a *sui generis* form of intellectual property right), which has been specifically adapted for the process of plant breeding and has been developed with the aim of providing incentives for breeders to develop new varieties of plants. For plant breeders' rights to

be granted, a new variety under UPOV must be (1) novel, (2) distinct from existing varieties, (3) sufficiently uniform and (4) stable (or “true to type” after repeated cycles of propagation).

The use of traditional or native plant varieties cannot be protected under UPOV, because by definition they do not satisfy the condition of novelty. Also, traditional varieties, with the exception of clones or seed-propagated landraces of narrow genetic diversity are not sufficiently homogeneous. However, UPOV is relevant to BioTrade for a variety of reasons.

Most importantly, the UPOV plant variety protection can provide critical incentives for domesticating wild-type species of native biodiversity through breeding. This is particular relevant for ornamental and medicinal species, where growing markets and product quality requirements entail increasing demand for specific and standardized plant properties. This development drives the shift from extracting heterogeneous materials in natural habitats towards the more efficient farming of superior plant types targeted to specific purposes. It is fair to say that, amidst the controversy concerning UPOV’s effect on developing country agriculture, the potential of UPOV to stimulate the development of improved varieties of native crops and the domestication of wild plants is not getting sufficient attention.

Secondly, UPOV can be conceptualized as a kind of (admittedly simplified) ABS system for the genetic resources embodied by commercial varieties. Examining UPOV from this perspective provides useful lessons for general ABS schemes. UPOV not only provides economic benefit to breeders to compensate them for their breeding investment, but significant benefits also accrue to the population at large through more productive and suitable plants. Contributing to the conservation rationale, UPOV also stimulates the use of genetic resources (both in breeders’ hands and beyond) for which demand is otherwise non-existent or limited. At the same time, there are explicit UPOV exceptions to the rights of the breeder. One, known as the “breeder’s exemption clause”, allows the use of the propagating material of the protected variety, without prior authorization, for the purpose of breeding other varieties or for research. The breeder’s exemption optimizes variety improvement by ensuring that the genetic resources contained in varieties remain accessible to all breeders. Importantly, the second exception, also known as the “farmers’ privilege”, permits the use of a protected variety for subsistence farming, though the use of the variety for cash crop farming is subject to PBR. It should also be noted that many plant variety protection titles are held by public institutions, which can selectively benefit local farmers using protected varieties under privileged conditions.

7.4.2 Geographical indications

A geographical indication (GI) is a sign identifying goods as having a specific geographical origin and possessing qualities, reputation or characteristics that are essentially attributable to that place of origin (a village, region or country). BioTrade products typically have qualities that derive from their place of production and are influenced by specific local factors, notably biodiversity, climate, soil and management practices during production. GIs may be used for a wide variety of products: from wildlife, agriculture, but mostly obtained through processing. Typically, GIs highlight product qualities, which are due to human factors associated with the place of origin of the products, such as specific manufacturing skills and traditions.

GIs act as a certification that the product possesses certain qualities, or enjoys a certain

reputation, due to its geographical origin, and often carry a price premium. Like trademarks, GIs assist consumers in differentiating products by allowing them to make purchasing decisions by associating signs with known qualities of goods, including the reputation of the producers. A GI tells consumers that a product is produced in a certain place and has certain characteristics that are due to that place of production²⁶.

If not adequately protected, GIs may be misrepresented by dishonest commercial operators. False use of GIs by unauthorized parties is detrimental to consumers and legitimate producers. Consumers are deceived into believing that they are buying a genuine product with specific qualities and characteristics, when they are in fact getting an imitation. Legitimate producers are deprived of valuable business and the established reputation of their products is damaged.

GIs are a means of providing the necessary governance for communities to retain control over biological resources, associated traditional knowledge, and the names of products that can be successfully differentiated in the market. GI protection is a matter of having exclusive right in trade to the use of a name. The ways in which this right can be exercised are defined by the available legal framework. GI protection is through international treaties and national laws under a wide range of concepts, including:

- special laws for the protection of GIs;
- trademark laws in the form of collective marks or certification marks;
- laws against unfair competition;
- consumer protection laws, or
- specific laws or decrees that recognize individual geographical indications.

Unauthorized parties may not use a GI in respect of products that do not originate in the place designated by that indication. Applicable sanctions range from court injunctions preventing the unauthorized use to the payment of damages and fines.

At the international level, a number of treaties administered by WIPO provide for the protection of geographical indications, most notably the *Paris Convention for the Protection of Industrial Property*, and the *Lisbon Agreement for the Protection of Appellations of Origin and Their International Registration*. Furthermore, through the work of the Standing Committee on the Law of Trademarks, Industrial Designs and Geographical Indications, WIPO explores new ways of enhancing the international protection of geographical indications.

European countries have a long tradition in the protection of geographical indications, for a variety of product classes, including cheeses, fresh, dried and processed vegetables and legumes. However, the challenges for GI implementation in developing countries are greater than in developed economies because the institutional context tends to be weaker vis-à-vis fraud repression, intellectual property, and natural, biological and

²⁶ By contrast a trademark is a sign used by an enterprise to distinguish its goods and services from those of other enterprises. It gives its owner the right to exclude others from using the trademark. A trademark will often consist of a fanciful or arbitrary. Unlike a trademark, the name used as a GI will usually be predetermined by the name of the place of production. It may be used by all producers who make their products in the place designated by a GI and whose products share specified qualities.

Box 11: Lessons from GI implementation in developing and transformation countries

(Opportunities are indicated with a + symbol and pitfalls with – symbol; Adapted from Larson 2007)

Biodiversity conservation

- + Product differentiation and value adding through GI development, if based on well-managed extractive and agricultural activities, provides incentives for the sustainable use of biological and cultural diversity.
- Linking a GI to a specific variety, breed or subspecies as a response to productivity and market demands marginalizes other genetic resources that are biologically and culturally relevant.

Knowledge and practices

- + Strong links between product and culture justify GI protection and benefit rural development.
- + Once small producers have achieved the quality standards needed to access new markets, precise use of geographical information in labeling can be easily implemented with or without GI registration.
- + Traditional knowledge that is key to food production such as seed selection criteria, recipes and food conservation practices, can be effectively used for GI development and thus protected from the most obvious forms of biopiracy.
- Well-documented knowledge and information about the biological resources and the cultural practices with GI potential is lacking in developing countries.

Economic benefits

- + Convergence of GI strategies with other market incentives such as fair trade labeling and organic certification is useful for small organizations.
- Small producers are vulnerable in national and export markets for economic and scale reasons, which cannot be addressed solely by GI differentiation.
- The distribution of benefits within value chains remains unclear and several cases point to concentration of power in transformers and distributors.
- In the absence of democratic governance structures the value added by the GI monopoly may not be capitalized by regional interest or by small farmers.
- Market segmentation that attends only high-end niches may generate economic exclusions or inhibit access to nutritious and culturally valuable resources by local or low income populations.

Governance

- + The regulatory council of a GI can selectively benefit small groups of producers
- + Arbitrary exclusions or conflicts due to errors in GI name selection can be avoided by using the best available information.
- Wide or imprecise geographical delimitations (due to the recognition of generic names as GIs, mistakes and political considerations) function against the empowerment of small farmers favoring speculation with raw materials and delocalization of production.
- Registration of names that are generic within a cultural region (although they may seem specific to a distant consumer) may generate exclusion problems and even provoke international trade and IPR conflicts.
- Formal definitions of quality imposed by external stakeholders tend to provoke exclusions of legitimate but culturally different producers.

Enabling environment

- Complying with labeling, safety and traceability regulations implies organizational and technical efforts for small organizations that are challenging by themselves.
- Legal frameworks and support measures coming from different sectors of government are not well coordinated producing complex scenarios for GI development.

genetic resource management. Consequently, the results are not as straightforward or positive as in developed countries, but there are also important opportunities to be grasped, because of the existing biological and cultural diversity. Box 11 presents some of the positive and negative experiences with the implementation of GIs in developing and transformation countries, with emphasis on the effects on small-holders and the conservation of biodiversity. Lessons learnt from case studies suggest that GI strategies in these countries do not only imply supporting GI protection but also strengthening national and regional institutions and the economic environment in which the GIs will develop.

7.4.3 Recommended reading

Larson 2007; Vandecandelaere et al. 2009; Ilbert and Petit 2009;

7.5 Quality standards and certifications

Certification refers to the confirmation of certain characteristics of a product, its producers, processors or traders. This confirmation is provided through an external review or audit by a specific organization authorized or accredited to perform the certification. Certification provides consumers with the assurance that a particular product, production process or service conforms to standards of environmental stewardship, food safety or social equity. Some certifications, particularly privately managed labels, may also combine several quality certifications, for example compliance with sustainable harvesting methods with goals of social equity.

In a world in need of embarking on a path of greater sustainability, quality certifications are in increasing demand, as buyers of BioTrade products desire assurances of particular qualities, traceability and product safety. Consumers increasingly ask questions such as: Is that eco-hotel really delivering on reducing environmental impacts and benefiting the local community? Is that forest actually managed with respect for the biodiversity in it? And are the products in that shop truly from sustainable wild collection as the label claims? Credible quality assurances can provide an advantage in consumer choice, in an increasingly competitive market.

Because of the multi-faceted nature of BioTrade, there is no particular certification and labeling system for it. Rather, ethical BioTrade relies on existing certification mechanisms. The following deals with certifications in relation to the international dimension of BioTrade only. There is also an increasing number of quality labels for use within producer countries, however, evidence from country studies suggests that domestic consumers still lack the awareness to value BioTrade-relevant quality labels, such as organic or fair trade products. For example, consumers of botanicals in Peru generally look for the approval seals of government agencies merely attesting to the safety of a particular product. There is much room for local consumers to develop a greater appreciation for the environmental and social footprint of their consumption.

Table 11 lists some of the certifications that are most widely used in BioTrade. Most certifications are voluntary, but there is a tendency for some trade and food jurisdictions to adopt them as mandatory, that is as obligatory requirements for market authorization. For example, HACCP is mandatory for the market access of fruit juices in the US.

Table 11: Selection of BioTrade-related certification frameworks and quality standards

Quality standard/Certification	Purpose and operational aspects
Good Manufacturing Practice (GMP)	Quality assurance and control for products incl. pre- and post-manufacturing processes to ensure sanitation and the minimization of the risks inherent in food and medicinal production, processes which cannot be assessed by only testing the final products.
GlobalGAP	A global standard for the certification that food is produced by minimizing the environmental footprint of farming, by ensuring farm worker health as well as animal welfare. GlobalGAP resulted from harmonizing regional quality systems thus allowing farmers to avoid multiple audits for different markets.
International Federation of Organic Agricultural Movements (IFOAM)	A worldwide umbrella organization for the organic agriculture movement, uniting more than 750 member organizations in 108 countries with a mission to lead, unite and assist the global organic movement. IFOAM provides the conceptual foundation of organic agriculture, emphasizing health, ecology, fairness and care.
EU regulation on organic agriculture (No 834/2007)	Sets out comprehensive and detailed rules for organic production and the labeling of organic products that are binding across all EU member states.
Rain forest alliance	Uses the comprehensive standards of the "Sustainable Agriculture Network" (SAN), which address social, economic and environmental criteria, in particular wildlife conservation and worker welfare. Encourages integrated pest management, but allows the use of agrochemicals if these are deemed indispensable to protect the crop, and used in a way that safeguards human health and the environment.
Forest Stewardship Council (FSC)	Voluntary global certification system promoting sustainable forest management through standard setting and labeling of timber and other forest products, thus enabling customers to choose products from socially and environmentally responsible forestry. Addresses illegal logging, deforestation and global warming and has positive effects on economic development, environmental conservation, poverty alleviation and social and political empowerment.
Marine Stewardship Council	Certifies sustainably managed ocean fisheries that observe science-based recommendations for sustainable fishing practices, particularly those that secure fish stocks for the future, and ensure seafood traceability through specific audits against the MSC Chain of Custody standard.
Hazard analysis and critical control points (HACCP)	A voluntary certification of food safety (mandatory in some food jurisdictions) that identifies physical, chemical, and biological hazards in production processes that can cause the finished product to be unsafe, and designs measures to reduce these risks to a safe level. Thus, HACCP pursues the prevention of hazards rather than finished product inspection.
International Fairtrade Certification Mark	Owned by Fairtrade International (FLO), an association of producer and marketing organizations, and used mostly for agricultural commodities, this certification mark appears on products as a guarantee that disadvantaged producers are getting a better deal. This can include premiums over market prices, purchase guarantees, capacity development, or other elements benefitting poor producers and processors.

The key incentive for producers and traders to obtain BioTrade-relevant certifications is the price premiums consumers are willing to pay over conventional products in particular markets, if increased revenues exceed the costs associated with certification. These include transactional expenses as well as costs for modifications to the production or processing practices that may be needed to align them with quality and certification

standards. In addition to premiums, certifications also bring other benefits for producers. Certification and product labels often prove to be a critical step towards capacity development for quality management, or to check illegal logging, reduce deforestation, and bring about greater ecosystem services. A testimony to the value and growing importance of certifications in marketing and market access is the fact that some 90% of Peruvian BioTrade companies held organic and/or fair trade certifications in 2010.

In the past, certification was restricted to enterprises that could afford it. However, more recent developments in the growth of labeling standards for different markets (particularly for “organic” labels), the emergence of certification agencies with global coverage (e.g. FSC, Rainforest Alliance, IFOAM), better horizontal integration, and growth of membership, has created economies of scale and contributed to an increase in the accessibility of certification services for particular products. A number of these value-added labels share common monitoring and process indicators, raising the possibility to develop a set of ‘common minimum standards’ for marketing of biodiversity-based products.

Box 13: The role of the ISEA alliance in the establishment and monitoring of BioTrade-related quality standards

The ISEA alliance is a global association of social and environmental standards (incl. FLO, FSC, IFOAM, MSC, and others) working to develop codes of conduct that standard setting organizations can use to ensure that when they create or apply a new standard they will result in measurable progress towards social and environmental objectives, without creating unnecessary hurdles to international trade. ISEA has released codes (good practices) for setting standards, for assessing the impacts of standards systems, and for assuring compliance with standards. ISEA codes build on World Trade Organization disciplines of openness, transparency and participation, as well as on a consultation process that involves business, governments, campaigners, scientists and consumers. The ultimate goal of ISEA is to enable consumers to choose goods and services that have been ethically sourced, help the environment and guarantee producers a decent living.

ISEA has released three codes to date:

The Standard-Setting Code

- Sets out requirements for the process by which standards are developed and revised.
- Emphasizes the importance of an open and transparent standard-setting process and inclusive stakeholder engagement in the development and decision-making around the standard.

The Impacts Code

- Sets out the process by which standards systems can provide evidence of their contributions to social and environmental impacts.
- Requires that standards systems understand the change that they are seeking to bring about and then measure their progress towards that change.

The Assurance Code (in development as of January 2012)

- Sets out requirements for auditing, certification and accreditation bodies that support the credibility, accessibility and growth of these activities.
- Builds on existing good practice in assurance to provide additional guidance specific to social and environmental standards systems.

Global agricultural trade, in general, has been characterized by the increasing importance of standards. Satisfying the food safety requirements of importing countries can be difficult and prohibitively expensive (see section 7.2.1). Thus, some certifications of importing countries

have emerged as non-tariff trade barriers, especially where they have become more complex because of both the range of items covered by mandatory standards and the increase in stringency of standards. Demonstrating compliance with standards has become more complicated also because of a shift from product standards, largely enforced through testing at borders (of exporting and importing countries), towards controls over the way that products are grown, harvested, processed and transported. Public or mandatory standards have increasingly been complemented by collective private standards such as EurepGAP and HACCP, which act as additional trade barriers.

7.5.1 Recommended reading

ICIMOD 2010; Ivanova 2011; Zeidler et al. 2011.

8 Instructions for trainers

This section provides some ideas for the use of this training manual in events and workshops aimed at developing capacities on BioTrade.

Exercise 1: The manual can be used as required reading for course participants either prior the training event, during it to or in preparation for a final examination to certify the individual attainment of capacity development objectives. Reading requirements could be for the manual in its entirety, or regarding particular sections.

Based on the content of the manual, there is a range of questions that participants can be asked to determine whether training objectives have been achieved, for either certification or course evaluation purposes. There is a large number of potential questions that are evident to any careful reader of the manual, but here are some suggestions for questions:

- Explain what BioTrade is and how it relates to development and environmental objectives?
- What are the factors or elements in BioTrade value chains that favor poverty alleviation outcomes, particularly in reference to women and vulnerable groups?
- Are quality labels for BioTrade products a good or bad thing from the producer country perspective?
- Describe two international certifications relevant to BioTrade. What is their purpose, and what benefits arise from them for both producers and consumers?
- Why do importing countries place so much attention on food safety?
- What is the role of agriculture in BioTrade, and how can it be made more sustainable?

Exercise 2: The questions under Exercise 1 could also be posed in a more specific manner in order to elicit responses in the context of the trainee's country of origin or BioTrade experience. To illustrate this, the first two questions of Exercise 1 could be re-phrased as follows.

- Explain the main BioTrade sectors in your country. How do activities in those sectors contribute to the development in your country, and what environmental outcomes have been observed?
- Who are the main beneficiaries of BioTrade in your country? Has it any effect on social equity and poverty, in particular on women? Explain using concrete examples!

Exercise 3: The participants of the training course/workshop are asked to divide in break-out groups of at least 5-6 persons each, but into no more than 3 groups. Each group may consist of individuals from different countries and will select one particular value chain or BioTrade sector of any of the countries represented by the group. Each group will assess the selected BioTrade sector using the major sections of the manual (or a selection thereof) as a thematic guide. The assessment should include a brief characterization of the sector, a SWOT²⁷ analysis in relation to environmental stewardship, social equity and profitability, and a proposal for improvement in the national regulatory environment. The group will prepare and present a Powerpoint presentation of 15-20 minutes to the plenary. This will be followed by a plenary discussion addressing commonalities between cases, discrepancies in opinion, omissions, etc. At least 2 hours are needed for the discussions and assessment within each group, perhaps with additional time assigned to group delegates charged with the preparation of the presentations. The presentation and discussion of each group in plenary will take 40-60 minutes per group. Major conclusions, controversies, recommendations, etc. should be recorded as bullet points or visualized on flip charts or other suitable visualization technique.

Exercise 4: This exercise is an alternative to exercise 3. It combines the learning experience from discussing BioTrade issues with the opportunity for the workshop's participants to familiarize themselves with each other's work.

Participants are asked to come to the workshop prepared to make a 10-minute presentation in plenary on a BioTrade value chain/sector of their choice. The presentation should address the themes covered in the manual, but these could be allocated to participants in a manner that ensures a plurality of experiences per theme, but avoids too much redundancy. Plenary discussions would be interspersed between sets of 3-4 presentations (grouped by theme, BioTrade sector or geographic region).

Exercise 5: Role-play can be a very entertaining and insightful exercise to illustrate the diverging interests of different stakeholders of BioTrade value chains, and the need for them to compromise and negotiate, but it doesn't work equally well for all groups and it requires someone with moderating skills/experience to steer the process. Also, for it to be useful, role-play needs to be staged within the boundaries of the participants' work experience. With these caveats, role-play can be a rewarding course experience.

There are many BioTrade themes that lend themselves for improvisational theatre enacted by volunteering course/workshop participants. Here are a few examples:

- Contract negotiations between producers and buyers of BioTrade products about quantity, quality, delivery/purchase guarantees and prices.
- A two-minute window of opportunity to explain to an important national policy maker the importance of BioTrade and the policy change needed to improve the enabling (national) environment for sustainable BioTrade.
- An environmentalist discusses sustainability with a poor trader of illegal wildlife products.

²⁷ SWOT=Strengths, Weaknesses, Opportunities, Threats

9 Literature

Alston JM, Marra MC, Pardey PG, Wyatt TJ. 1998. Research returns redux: a meta-analysis of the returns to R&D. EPTD Discussion Paper No. 38. Washington, DC, International Food Policy Research Institute. <http://ageconsearch.umn.edu/bitstream/16056/1/ept-dp38.pdf>

[A landmark meta-study deserving more attention by national decision makers: Examining 294 studies of returns to agricultural R&D and extension revealed mean annual rates of return of 73 percent. The results support the belief that rural extension services coupled with agricultural research are a powerful instrument to increase agriculture-based livelihoods.]

Andersen R. 2008. Protecting Farmers' Rights in the Global IPR Regime: Challenges and Options. Trade Insights, Vol 3, No 2, p. 30-32.

[Introduces the concept of Farmers' Rights and its importance for agrobiodiversity, food security and poverty reduction. Discusses the possibilities for protecting these rights under the existing global IPR regime. Central options that are discussed pertain to creating a legal space within legislative frameworks for farmers' stewardship and innovations in agriculture, and establishing funding mechanisms at the national and international levels in order to scale up activities supporting them in their vital contribution to the global genetic pool.]

Andersen R, Winge T. 2008. Success stories from the realization of Farmers' Rights related to plant genetic resources for food and agriculture. The Farmers' Rights Project, Background study 7, 70 p. <http://www.fni.no/doc&pdf/FNI-R0408.pdf>

[Presents a collection of 17 success stories from 11 countries on the realization of Farmers' Rights as they are addressed in the International Treaty on Plant Genetic Resources for Food and Agriculture, namely the right to save, use, exchange and sell farm-saved seed, to protect traditional knowledge, and to participate in benefit sharing and in decision-making. Reported achievements concern effective farmer-scientist collaboration, capacity building, community based approaches and participatory approaches are all elements that have proved to be central. The report highlights the different approaches to develop better legislation and incentive structures for Farmers' Rights.]

ANSAB. 2009. Challenges and opportunities for Nepal's small and medium forest enterprises (SMFEs). Asia Network for Sustainable Agriculture and Bioresources Kathmandu, Nepal/FAO, 90 p. <http://www.ansab.org/wp-content/uploads/2010/09/Challenges-and-opportunities-for-Nepals-SMFEs.pdf>

[Describes the structure and mode of operation of SMFEs, some key NFTP species, as well as the potential for value addition through post-harvest processing and product development. Covers also barriers to BioTrade in Nepal and the role of domestic policies to capture greater added value]

Bishop J, Kapila S, Hicks F, Mitchell P, Vorhies F. 2008. Building Biodiversity Business. Shell International Limited and the International Union for Conservation of Nature: London, UK, and Gland, Switzerland. 164 p. http://cmsdata.iucn.org/downloads/bishop_et_al_2008.pdf

Birdlife International. 2008. State of the World's Birds. Indicators for our changing world. http://www.biodiversityinfo.org/userfiles/docs/SOWB2008_en.pdf

[Outlines the accelerating decline of the world's birds and what can be done to improve their status; identifies action to reduce habitat loss and over-exploitation that affects particularly parrots, pigeons and pheasants, and is most prevalent in Asia (eight out of the top ten countries with the highest numbers of birds at risk from exploitation are in Asia)]

Cabrera J. 2010. *The Political Economy of the International ABS Regime Negotiations*, ICTSD Programme on Natural Resources, Natural Resources, International Trade and Sustainable Development, Issue Paper No.2. International Centre for Trade and Sustainable Development, Geneva, Switzerland. <http://ictsd.org/downloads/2010/11/cabrera-political-economy.pdf>

[Examines the evolution of the negotiations of the international regime on ABS in the context of the CBD; addresses the relationships and potential synergies between the international regime and the World Trade

Organization (WTO), the International Union for the Protection of New Varieties of Plants (UPOV) and the World Intellectual Property Organization (WIPO).]

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- [Description of various legal instruments with relevance to ABS, such as the FAO International Treaty on Plant Genetic Resources for Food and Agriculture, the WTO Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPs), WIPO conventions and treaties, the UN Convention on the Law of the Sea, CITES, the Antarctic Treaty and Human Rights Instruments.]*
- CBD. 2007. Fifth Meeting of the Ad Hoc Open Ended Working Group On Access and Benefit-Sharing, Overview of recent developments at the international level relating to access and benefit-sharing, Convention on Biological Diversity, U.N. Doc. UNEP/CBD/WG-ABS/5/4/Add.1. <http://www.cbd.int/doc/meetings/abs/abswg-05/official/abswg-05-04-add1-en.pdf>
- [Based on consultations with WTO, WIPO and UPOV, explores potential synergies and inconsistencies with the CBD of legal and other instruments at international level relating to access and benefit-sharing.]*
- CBD 2009. The Jakarta Charter on Business and Biodiversity. <https://www.cbd.int/doc/business/jakarta-charter-busisness-en.pdf>
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- [Describes the reliance of local people in Tanzanian highlands, particularly of HIV affected households, on wild orchid exploitation for food and trade. Demand for these orchids is now far exceeding the traditionally sustainable harvesting and increasing international trade in these orchids is increasingly depleting the resource base.]*
- Coad L, Abernethy K, Balmford A, Manica A, Airey L, Milner-Gulland EJ. 2010. Distribution and Use of Income from Bushmeat in a Rural Village, Central Gabon. *Conservation Biology* 24(6): 1510-1518. <http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2010.01525.x/pdf>

[Investigates the relationship between hunting offtake and household wealth, gender differences in spending patterns, and the use of hunting incomes in two rural forest communities, Central Gabon, from 2003 to 2005, shows that hunting income is spent in part on items that do not contribute significantly to household food security]

Collinson C, Burnett D, Agreda V. 2000. Economic Viability of Brazil Nut Trading in Peru. Report 2520, Natural Resources Institute, University of Greenwich, UK, 62 p. <http://www.nri.org/projects/NRET/brazilnuts.pdf>

[Describes the international ethical and conventional trade in Brazil nuts, incl. Brazil nut uses, consumption, prices and value chain stakeholders, and profit margins for selected stakeholders. Examines specifically the Peruvian Brazil nuts export trade, its effect on alleviating rural poverty in the Madre de Dios Department, and value chain governance of Brazil nut exporting companies.]

CPD. 2009. Environment Related Trade Barriers and the WTO. CPD Occasional Paper Series 77, Centre for Policy Dialogue, Dhaka, Bangladesh, 17p. http://www.cpd.org.bd/pub_attach/OP77.pdf

[Explains the significance of the SPS and TBT agreements from a developing country perspective with emphasis on trade barriers related to certificates of environmentally sustainable production and extraction methods.]

Dao TA, Vu TB, Bui VM, Dao DH, Sautier D. 2009. Models of geographical indication protection in Vietnam: facts, difficulties and prospects. Mini symposium "Geographical indications in the landscape of global agriculture, 6 – 22 August 2009, Beijing International Convention Center, Beijing, China.

Dangour AD, Dodhia SK, Hayter A, Allen E, Lock K, Uauy R. 2009. Nutritional quality of organic foods: a systematic review. American Journal of Clinical Nutrition. In print. DOI:10.3945/ajcn.2009.2804.

EFEQ. 2005. Position paper concerning the EU proposal for a new regulation on chemicals (REACH). European Federation of Essential Oils, Hamburg, Germany. <http://www.unctad.org/BioTrade/BTFP/BTFP-docs/reach-efeo-positionpaper.PDF>

[Authored by EFEQ, an umbrella organization for 150 producers, traders and importers, which provides a major share of essential oils to EU Member States, the paper is an excellent example of effectively designed lobbying. The paper argues that essential oils, as complex natural substances of botanical origin, do not fit into the REACH, and proposes to add the category "natural botanically-derived substances" to article 3, together with an explicit exemption from REACH under Annex III for those natural substances falling under this specific category.]

Escobedo E. 2010. BioTrade: how business is driving change. In: Business 2010, a magazine on business and biodiversity 5(2). CBD, p. 7. <http://www.cbd.int/doc/newsletters/news-biz-2010-05-en.pdf>.

FAO. 1996. Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. Adopted by the International Technical Conference on Plant Genetic Resources, Leipzig, Germany, 17–23 June 1996.

FAO. 2007. The State of the World's Animal Genetic Resources for Food and Agriculture. Rome. Food and Agriculture Organization of the United Nations, Rome.

FAO. 2009. Draft Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture, Final Version. Food and Agriculture Organization of the United Nations, Rome, October 2009, 354 p.

FDA. 2009. Agency Response Letter GRAS Notice No. GRN 000273. <http://www.fda.gov/Food/FoodIngredientsPackaging/GenerallyRecognizedasSafeGRAS/GRASListings/ucm174945.htm>

[Notification of the US' Food and Drug Administration (FDA) accepting GRAS designation of Baobab dried fruit pulp (BDFP), based on evidence submitted by PhytoTrade of the product's composition that indicates similarity]

to other fruit based ingredients and corroborating evidence of a history of safe use as a food ingredient in Southern Africa, documentation regarding the method of processing, and an estimate of BDFP intake based on proposed use levels, and the possible presence of naturally-occurring toxicants.]

Fernandes R. 2009. Private standards and the WTO SPS agreement. Brussels Rural Development Briefings on ACP-EU development issues. http://brusselsbriefings.files.wordpress.com/2009/05/r-fernandes_eng.pdf

[Reviews the growing importance of private quality standards in the framework of the SPS agreement, in terms of their ambiguous role as trade barriers and opportunities for building reputation in high-quality supplier countries.]

Gaynor P, Cianci S. 2005. How U.S. FDA's GRAS Notification Program Works. Reprinted from Food Safety Magazine. <http://www.fda.gov/Food/FoodIngredientsPackaging/GenerallyRecognizedasSafeGRAS/ucm083022.htm#authors>

[This article provides an overview of a particular type of food ingredient regulatory classification: 'generally recognized as safe,' commonly referred to as GRAS. It describes the history of the GRAS program, how the Office of Food Additive Safety administers the program, and includes statistics about the program.]

GEF. 2006. Community action to conserve biodiversity. Linking biodiversity conservation with poverty reduction. Case studies from Latin America and the Caribbean. GEF Small Grants Programme. <http://sgp.undp.org/img/file/Community%20Action%20to%20Conserve%20Biodiversity.pdf>

[Assesses how 30 GEF-supported community-based biodiversity businesses across Latin America contributed to the MDGs and environmental and biodiversity management. Includes also case studies with non-native products, and derives broader lessons for BioTrade.]

Graffham A. 2009. Food safety and agricultural standards: challenges and opportunities for ACP exports. Brussels Rural Development Briefings on ACP-EU development issues. http://brusselsbriefings.files.wordpress.com/2009/05/agraffham_eng1.pdf

[Discusses requirements for ACP countries to meet international product standards under the SPS agreement and voluntary standards for fruits, vegetables and animal products.]

Gruenwald J, Galizia M, 2005. *Adansonia digitata* L. Market brief in the European Union for selected natural ingredients derived from native species. UNCTAD, Geneva, 35 p. Available from <http://www.BioTrade.org/ResourcesPublications/BioTradebrief-baobab.pdf>.

[Provides price developments for selected baobab products differentiated by trade channel and value added as well prices of substitutes. Describes marketing and sales promotion strategies as well as recommendations on different levels: supply chain management, promotion strategies and business-to-business opportunities. Validated through interviews with buyers, consumers, market experts and other relevant actors in the EU market.]

Gurung K. 2010. Essential oils sector study in Nepal: a detailed study of Anthopogon, Juniper and Wintergreen essential oils. A report submitted to GTZ Nepal, Narayani Complex, Lalitpur, Nepal, 59p.

Hermann M. 2009. The impact of the European Novel Food Regulation on trade and food innovation based on traditional plant foods from developing countries. Food Policy 34: 499-507. <http://dx.doi.org/10.1016/j.foodpol.2009.08.005>.

Hauselmann P. 2006. Organic certification of wild collection: a guarantee for sustainability? First IFOAM conference on organic wild production, Bosnia and Herzegovina, May 3rd-4th 2006, 7 p.

Ilbert H, Petit M. 2009. Are geographical Indications a valid property right? Global trends and challenges. Development Policy Review, 27(5): 503-528.

[This article explores what is at stake in the international conflict on geographical indications (GIs), particularly

for developing countries. It first examines how the WTO panel has obliged the European Union to open its registration system to third countries and how the ongoing negotiations on GIs seem to be reaching stalemate. Initiatives showing how GIs are a key political and trade issue are identified in Turkey, India, China, Colombia and Ethiopia.]

- ICIMOD. 2011. Harnessing the potential of BioTrade for transitioning to a green economy. Country study Nepal. Prepared by International Centre for Integrated Mountain Development (ICIMOD). Kathmandu, 34 p, 10 annexes.
- [Covers the potential and challenges of BioTrade in Nepal, incl. investment opportunities, incl. country processing as well as regulatory policies and trade frameworks. Provides recommendations as to capacity development needs, financial services and marketing.]*
- ICTSD. 2010. CBD reaches agreement on access and benefit sharing, but some question its effectiveness. International Centre for Trade and Sustainable Development. <http://ictsd.org/i/news/bridgesweekly/92903/>
- [This commentary critiques the ambiguity of the language of the adoption of the Nagoya Protocol in 2010 on ABS. Arguing that disagreements were too strong for CBD Parties to reach genuine agreements on a number of core issues, the article proposes that success of the Protocol will depend on national implementation, future review processes and progress of some of its provisions in the framework of other conventions.]*
- Ingar V. 2010. Natural products exports under the focus of BioTrade: Business 2010, a magazine on business and biodiversity 5(2). CBD, p. 11. <http://www.cbd.int/doc/newsletters/news-biz-2010-05-en.pdf>.
- ITC. 2003. Market brief on the US market for natural ingredients used in dietary supplements and cosmetics. International Trade Centre UNCTAD/WTO, Geneva. 132 p. <http://www.intracen.org/organics/documents/us-market-for-natural-ingredients-2003.pdf>
- IUCN. 2009. The time for biodiversity business. International Union for Conservation of Nature. Available at: http://cmsdata.iucn.org/downloads/newspaper_web_en_final.pdf
- [Contains a variety of examples of successful biodiversity based business, plus insights on market creation, local community development, the role of governments, grants, benefit sharing and certification for scale-up]*
- Ivanova Y. 2011. Exploiting the potential of BioTrade in Peru for a transition to a green economy. Pro Naturaleza, Fundacion Peruana para la Conservacion de la Naturaleza. 56p.
- [Overview of the BioTrade sector in Peru, incl. policies, certification and labeling, providing a detailed discussion on barriers to its further expansion. Analyses the role of public investments, access to financial services, capacity development, certifications and regulations. A note of caution: some of the BioTrade figures in the report appear to be hugely inflated, as they include the production of agricultural commodities from introduced varieties (mango, grapes, asparagus), contradicting the definition of BioTrade used in the report.]*
- Jaramillo L. 2010. The BioTrade Network: Business 2010, a magazine on business and biodiversity 5(2). CBD, p. 6. <http://www.cbd.int/doc/newsletters/news-biz-2010-05-en.pdf>.
- Jones A. 2005. The potential impact of REACH on exports of BioTrade products to the European Union. UNCTAD BioTrade Facilitation Programme. <http://www.BioTrade.org/BTFP/BTFP-docs/reach-unctad-discussionpaper.PDF>
- [Describes the history and rationale of the REACH system, and explores specifically the implications of REACH for market access of BioTrade products to the EU.]*
- Jones A, Craddock N. 2009. Issue paper concerning the proposed amendments to the European Novel Food Regulation (EC) 258/97 with particular reference to traditional foods from developing countries: definitions, concepts and history of safe food use assessment. UNCTAD, 93 p. <http://www.unctad.org/BioTrade/BTFP/BTFP-docs/novelfoods-issue.pdf>
- Identifies and analyses critical concepts, definitions and terminology that require clarification within the proposed NFR, and suggests and recommends possible interpretations in relation to consumer protection and public health. Examines and compares the approaches taken by other countries, highlighting the distinctions*

drawn in these jurisdictions between foods with or without a prior history of consumption and the impact of such history on the safety assessment that is required. Analyzes the technical aspects related to preparing a Dossier for a Traditional Food from a developing country and the existing guidelines that have been used.

Laird S, Wynberg R. 2008. Access and benefit-sharing in practice: Trends in partnerships across sectors. CBD, Montreal, Technical Series No. 38, 40 pages. <http://www.cbd.int/doc/publications/cbd-ts-38-en.pdf>

[Provides an overview on ABS arrangements, illustrating tendencies in the pharmaceutical, biotechnological, seed, horticultural and botanicals industries. Excellent source on recent trends in demand for access to genetic resources and benefit-sharing, and industry perspectives on ABS policy and implementation.]

Larson J. 2007. Relevance of geographical indications and designations of origin for the sustainable use of genetic resources. Global Facilitation Unit for Underutilized Species, Maccaresse, Italy, 95 p. http://www.underutilized-species.org/Documents/PUBLICATIONS/gi_larson_lr.pdf

[This study provides a worldwide panorama of current trends in Geographical Indications (GIs) as they relate to biodiversity conservation and rural development, and their potential contributions to poverty, hunger alleviation and environmental goals. Argues that GIs can be useful in developing and consolidating a differentiated products with geographical identity and a reputation, in building quality systems and providing governance to value chains based on local biological resources and traditional and innovative knowledge and practice. Challenges and opportunities facing small producers from developing and transformation countries are identified, based on the experience of two dozen GI cases from all continents.]

MacGregor J. 2006. The call of the wild: captive crocodilian production and the shaping of conservation incentives. TRAFFIC International, Cambridge, UK. http://www.traffic.org/species-reports/traffic_species_reptiles11.pdf

[Based on information gathered through interviews of crocodilian skin industry participants in Colombia and Zimbabwe as producers and in major consumer countries, this study assesses the impacts on markets for crocodilians of the shift away from their wild harvest toward captive production, as well as the impact on conservation of wild crocodilians of this shift. It concludes that captive breeding has been so successful that it has effectively replaced the harvest of wild crocodilians. It recommends that the crocodilian skins industry should maintain the sustainable exploitation of wild crocodilians in order to maintain conservation incentives.]

Marshall N, Milledge SAH, Afonso PS. 1999. Stormy Seas for Marine Invertebrates: trade in sea cucumbers, seashells and lobsters in Kenya, Tanzania and Mozambique. Trade Review. TRAFFIC East/Southern Africa. Nairobi, Kenya.

[On trade in sea cucumbers, seashells and lobsters in Kenya, Tanzania and Mozambique; describes targeted species, importance for the livelihoods of coastal populations; estimates trade volumes and assesses sustainability and policy issues]

McNeely JA, Scherr SJ. 2001. Common ground, common future. How ecoagriculture can help feed the world and save wild biodiversity. 24 p.

McNeely JA, Scherr SJ. 2003. Ecoagriculture: Strategies for Feeding the World and Conserving Wild Biodiversity. Island Press, Washington DC, USA.

Mayoux L, Mackie G. 2007. Making the strongest links. A practical guide to mainstreaming gender analysis in value chain development. International Labour Organization, Addis Ababa, 98p. http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/instructionalmaterial/wcms_106538.pdf

[Describes tools and support services for women entrepreneurs designed to mainstream gender into micro and small enterprise development methodologies. It requires previous value chain analysis experience and interest in identifying and addressing gender issues at different stages and levels of the value chain analysis process. Recommended actions will empower women, and hence maximize the contribution to employment creation, economic growth and poverty reduction.]

MEA. 2005. Millenium Ecosystem Assessment. <http://www.maweb.org/en/index.aspx>

[Assesses the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being. The MA has involved the work of more than 1,360 experts worldwide. Their findings, contained in five technical volumes and six synthesis reports, provide a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide (such as economic products, food, clean water, food, flood control, pollination). Several MA chapters deal in an unprecedented comprehensive manner with issues relevant to biodiversity, food, nutrient management, climate change, cultivated systems and poverty reduction, all related to BioTrade.]

Moorhead A. 2006. Missing the Market: How exotic foods are being barred from the EU. UNCTAD, CBI, GTZ, GTU, GFU and IPGRI. http://www.BioTrade.org/Events/events_docs/NFR_mailversion_final.pdf

[Describes the requirements for NFRs, the lengthy authorization process involved, the intent of the legislation, its negative effects on the use of traditional food products seen as "novel" from the EU perspective.]

Mori SA, 1992. The Brazil Nut Industry. Past, Present and Future. In: Sustainable Harvest and Marketing of Rain Forest Products. Plotkin, M. and L. Famolare (eds.). Island Press, Washington, D.C. & Covelo, California.

Müller A. 2005. Cultured Pearls. Update on Global Supply, Demand and Distribution. International Colloquium on Gemmology, April 29 – May 2, 2005, Basel, Switzerland <http://www.hinatatrading.com/GemmoBasel.pdf>

[Conference paper providing an update on the global market of sea pearls from several oyster species in the genus Pinctada in the Pacific; gives production and quality trends, describing oversupply as leading to price decline.]

Orr D. 2006. Framing sustainability. Conservation Biology 20: 265-266.

Peres CA, Baider C, Zuidema PA, Wadt LHO, Kainer KA, Gomes-Silva DAP, Salomão RP, Simões LL, Franciosi ERN, Cornejo Valverde F, Gribel R, Shepard GH, Kanashiro M, Coventry P, Yu DW, Watkinson AR, Freckleton RP. 2003. Demographic Threats to the Sustainability of Brazil Nut Exploitation. Science 302 (5653): 2112-2114. <http://www.sciencemag.org/content/302/5653/2112.full>

Pikitch EK, Doukakis P, Lauck L, Chakrabarty P, Erickson DL. 2005. Status, trends and management of sturgeon and paddlefish fisheries. Fish and Fisheries 6: 233-265. <http://www.caviarempor.org/FAFfinalsturgeonpaper.pdf>

[A thorough science-based survey of the use status and conservation of 27 species of sturgeons and paddlefishes. Producers of coveted black caviar, sturgeons are one of the most valuable wildlife commodities, but also among the most endangered fishes. A synopsis of commercial fisheries shows that long-term survival of sturgeon in the wild is in jeopardy as evidenced by dramatic declines and many fisheries crashing within 7–20 years of inception. The study recommends that beluga fisheries must be closed or harvest levels drastically reduced, in contradiction to current CITES trade quota. It is further argued that non-zero trade quotas are routinely approved despite non-compliance with CITES resolution requirements, the absence of accurate population structure and abundance information, and illegal harvest and trade. The study concludes that for CITES to be most effective, the parties should adopt a precautionary approach with decisions on quotas considering uncertainty of population status, evidence of decline and rates of illegal fishing.]

Pretty J. 2008. Agricultural sustainability: concepts, principles and evidence. Phil. Trans. R. Soc. B 2008 363, 447-465. doi: 10.1098/rstb.2007.2163.

Roe D. 2008. Trading Nature. A report, with case studies, on the contribution of wildlife trade management to sustainable livelihoods and the Millennium Development Goals. TRAFFIC International and WWF International. http://www.traffic.org/general-reports/traffic_pub_gen19.pdf

Ruiz M. 2008. Una lectura crítica de la Decisión 391 de la Comunidad Andina y su puesta en práctica en relación con el Tratado Internacional. Recursos Naturales y Ambiente 53:136-147.

[The Andean Community (Bolivia, Colombia, Ecuador, Peru and Venezuela) was the first regional organization to pass legislation regarding access to genetic resources and benefit-sharing (ABS) in 1996. Decision 391 on a Common Regime on Access to Genetic Resources has become an important milestone and reference in the debate regarding ABS. However, over ten years after its coming into force, Decision 391 has resulted in considerable transaction costs and uncertainties regarding its scope and ambit. The private sector has been discouraged from seeking permits under Decision 391, and much biodiversity research, particularly taxonomy, has come to a halt. The paper also discusses inconsistencies of Decision 391 with the International Treaty on Plant Genetic Resources for Food and Agriculture, which has been adopted recently.]

Schaltegger S, Beständig U. 2010. Corporate Biodiversity Management Handbook. A guide for practical implementation. Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), Berlin, Germany, 64 p.
http://www.bmu.de/files/pdfs/allgemein/application/pdf/handbuch_biodiversitaetsmanagement_bf_en.pdf

SGRP. 2010. The importance of recognizing the International Treaty in the CBD's Protocol on access and benefit-sharing. SGRP, Rome, Italy. 8 pp.
http://www.biodiversityinternational.org/policy_law/access_benefit_sharing.html

[Describes the rationale of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), a sui generis multilateral system of access and benefit sharing of the genetic resources of over 50 crops. The ITPGRFA is described as consistent with the CBD's ABS provisions, and accords a high level of legal certainty through its standard material transfer agreement. The paper stresses the importance of taking a nuanced approach to developing ABS regulations that are tailored to specific categories of genetic resources and their uses.]

Scree AA. 2009. Morocco's trilobite economy. Saudi Aramco World, March/April 2009, Vol 60 No. 2. <http://www.saudiaramcoworld.com/issue/200902/morocco.s.trilobite.economy.htm>

[Describes the specimen-mining, specimen-preparation and trade in Morocco of fossils of trilobites, a highly diverse group of arthropods that emerged in the Cambrium and are extinct now. Of fascinating beauty and diversity -50,000 species known- trilobite fossils are in high demand by professional and amateur collectors, mostly in the US. Specimens fetching in excess of US\$ 1000 are not uncommon. The industry employs some 50,000 people and generates US\$ 40 million in local revenues.]

Shakya B. 2005. Nepal: Exports of Ayurvedic herbal remedies and SPS issues. In: Gallagher P, Low P, Stoler AL (eds.): Managing the challenges of WTO participation. Cambridge University Press, 666p.
http://www.wto.org/english/res_e/booksp_e/casestudies_e/case31_e.htm.....

[Intriguing account of a Nepalese producer of Ayurvedic herbal remedies. Encouraged by Nepal's unique supply possibilities and rising demand in Western countries, this entrepreneur tries to respond to export opportunities, but soon faces difficulties in meeting safety and health requirements, under GMP and the WTO-SPS agreement, owing to the absence of national Nepalese policies to guide exporters.]

Singh S, Boonratana R, Bezuijen M, Phonvisay A. 2006. Trade in Natural Resources in Stung Treng Province, Cambodia: An assessment of the wildlife trade. TRAFFIC. MWBP. Vientiane, Lao PDR. www.traffic.org.

[This study generated useful recommendations to governments, non-governmental organizations, donors and others in considering how interventions to reduce illegal and/or unsustainable wildlife trade might be applied more effectively in future.]

Stiles D. 2004. The ivory trade and elephant conservation. Environmental Conservation 31: 309-321.

Swanson BE. 2008. Global review of good agricultural extension and advisory service practices. Food and Agriculture Organization of the United Nations. 82 p.

[This publication identifies good practices within different agricultural extension and advisory service institutions that have implemented the use of new agricultural innovations in improving rural livelihoods and in educating farmers to use sustainable natural resource management practices in different countries.]

- Tilman, D., Cassman, K.G., Matson, P.A., Naylor, R. and Polasky, S. 2002. Agricultural sustainability and intensive production practices. *Nature* 418: 671-677.
- TRAFFIC, 2008. "What's Driving the Wildlife Trade? A Review of Expert Opinion on Economic and Social Drivers of the Wildlife Trade and Trade Control Efforts in Cambodia, Indonesia, Lao PDR and Vietnam". East Asia and Pacific Region Sustainable Development Discussion Papers. East Asia and Pacific Region Sustainable Development Department, World Bank, Washington, DC. www.traffic.org
- TRAFFIC. 2010. TRAFFIC Bulletin Vol. 23 No. 1 (2010)
[The TRAFFIC Bulletin publishes information and original papers on the subject of trade in wild animals and plants, striving to be a source of accurate and scientific information and a tool for rational wildlife trade policies. This issue deals with rhino poaching, ivory trade controls through isotope identification of provenance, COP15 of CITES, the de-listing of a South-African Abalone species from CITES appendices, the poaching of Malayan Sun Bears, and with an international selection of reported wildlife seizures.]
- Trewavas AJ. 2001. The Population/Biodiversity Paradox. Agricultural Efficiency to Save Wilderness. *Plant Physiology* 125: 174-179.
- Trewavas AJ. 2002. Malthus foiled again and again. *Nature* 418: 668-670.
- Trewavas AJ. 2004. A critical assessment of organic farming-and-food assertions with particular respect to the UK and the potential environmental benefits of no-till agriculture. *Crop protection* 23: 757-781.
- UNCTAD. 2005. Selected BioTrade definitions and concepts. <http://www.BioTrade.org/docs/BioTrade-definitions.pdf>
- UNCTAD. 2007a. UNCTAD BioTrade Initiative BioTrade Principles and Criteria. United Nations, New York and Geneva, 8p. http://www.BioTrade.org/BTFP/BTFP-docs/Working_docs/UNCTAD_BT_PC_en.pdf
- UNCTAD. 2007b. Progress in supporting CITES implementation. <http://www.cites.org/common/cop/14/inf/E14i-35.pdf>
- UNCTAD. 2010. Novel Foods. UNCTAD. <http://www.BioTrade.org/BTFP/btfn-novelfoods.htm>
[This URL link provides BioTrade Facilitation Program's overview of Novel Food Regulations, publications and workshops related thereto.]
- UNEP/CBD/SBSTTA/14/INF/34 29 April 2010. Sustainable agriculture and the sustainable use of agricultural biodiversity: concepts, trends and challenges. An information note submitted by Bioversity International for the Fourteenth Meeting of the Subsidiary Body on Scientific, Technical and Technological Advice of the Convention on Biological Diversity, 10-21 May 2010, Nairobi, Kenya, 59p. <http://www.cbd.int/doc/?meeting=SBSTTA-14>
- United Nations. 2009. The right to food. Seed policies and the right to food: enhancing agrobiodiversity and encouraging innovation. United Nations, General Assembly, A/64/170. New York. <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N09/424/73/PDF/N0942473.pdf?OpenElement>
[Explores how states could implement seed policies that contribute to the full realization of human rights. Identifies how research and development could best serve the poorest farmers in developing countries, and how commercial seed systems could be regulated to serve the right to food and ensure the right of all to enjoy the benefits of scientific progress. Examines how farmers' seed systems could be best supported, in order to serve the interest of all in the preservation of agrobiodiversity.]
- UPOV 2005. UPOV report on the impact of plant variety protection. http://www.upov.org/export/sites/upov/en/publications/pdf/353_upov_report.pdf
[Explains the rationale behind plant variety protection, including benefits accruing from stimulating plant breeding, and the enhanced availability of plant varieties. Using case studies from several developing and transition countries, the report describes national seed industries and the nature and impact of national plant

variety protection systems.]

Vandecandelaere E, Arfini F, Belletti G, Maescotti A. 2009. Linking people, places and products. A guide for promoting quality linked to geographical origin and sustainable geographical indications. FAO, Rome. 194 p. <http://www.fao.org/docrep/012/i1057e/i1057e00.pdf>

[Addressed to rural development practitioners, policy makers and rural community leaders, and using many illustrative case studies from developing countries, this guide offers a step-by-step approach to answer the main questions faced by development actors and facilitators who seek to identify, define and protect products whose quality is linked to geographical origin. The guide explains the procedures and elements for the sustainable development of such products.]

Webb M. 2009. Implications of standards compliance for ACP horticultural producers and exporters. Brussels Rural Development Briefings on ACP-EU development issues. http://brusselsbriefings.files.wordpress.com/2009/05/m-webb_eng.pdf

[Reviews the application of private voluntary food safety standards (PVS) in ACP countries. A survey of 102 horticultural export companies in East and West Africa showed that PVS create obstacles as well as opportunities to market access for ACP suppliers. Costly and inaccessible PVS are those derived from translating EU-centric standards into the very different ACP production environment.]

Western Rock Lobster Council. 2010. <http://www.rocklobsterwa.com/>

[Website of the the Western Rock Lobster Council (WRLC), a non-profit peak industry body representing the Commercial Western Rock Lobster Fishermen of Western Australia, with much information on a model case of sustainable exploitation of a significant marine resource. The WRLC addresses issues concerning the management system of the fishery, prepares submissions to Government on behalf of the industry, sources funding for industry projects, lobbies Government on behalf of the fishermen, provides advice and information to a number of committees within the various sectors of the fishery, assists with safety, training and education programs for fishermen, ensures Government processes are transparent, and ensures the catching sector of this valuable industry remains a viable, effective and responsible member of the fishing community.]

Wilkinson C (Ed.). 2004. Status of coral reefs of the world: 2004. Global Coral Reef Monitoring Network. Vol 1, 300p. http://www.reefbase.org/download/gcrmn_download.aspx?type=10&docid=9524

[This report documents how human activities continue to be the primary cause of the global coral reef crisis. The report details many new initiatives aimed at reversing this degradation incl. economic valuation. Among the major stresses to coral reefs direct human pressures arising from sediment and nutrient pollution and damaging fishing practices are particularly severe.]

WTO. 1998. Understanding the WTO Agreement on Sanitary and Phytosanitary Measures. http://www.wto.org/english/tratop_e/sps_e/spsund_e.htm

[Introduction to the agreement and overview of SPS measures, their use and purpose.]

WTO. 2010. The WTO Agreements series: Sanitary and Phytosanitary Measures. http://www.wto.org/english/res_e/booksp_e/agrmtseries4_sps_08_e.pdf

[Reviews the basic structure of WTO agreements, and presents key features of the SPS Agreement, highlighting international standards, the provisions of equivalence and transparency, and explains the difference between SPS and TBT.]

WWF. 2006. Cork screwed? Environmental and economic impacts of the cork stoppers market. World Wildlife foundation, 34 p. <http://www.wwf.org.uk/filelibrary/pdf/corkscrewed.pdf>

[Overview on the economic, environmental and biodiversity value of cork oak landscapes in Mediterranean countries; Analysis of the threats to the cork industry from the growing use of cork stopper substitutes, a tendency that reduces the incentive to preserve and manage cork oak forests.]

Zeidler J, Smith J, Schade K, Kandjinga L. 2011. BioTrade: A catalyst for transitioning to a green economy. Country study for Namibia. Draft 30 July 2011. 46 p.

[Describes the status of BioTrade in Namibia, its challenges and opportunities, certification and quality

standards, and benefits on poverty reduction.]

10 Acronyms and abbreviations

ABS	Access and Benefit-Sharing
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
EU	European Union
FDA	Federal Drug Administration
FSC	Forest Stewardship Council
GI	Geographical Indications
GRAS	Generally Regarded as Safe
HACCP	Hazard analysis and critical control points
IFOAM	International Federation of Organic Agricultural Movements
IPR	Intellectual Property Rights
MDG	Millennium Development Goals
NFR	Novel Food Regulation
n.a.	Not available
PBR	Plant Breeder Rights
REACH	EU regulation on “Registration, Evaluation, Authorization and Restriction of Chemicals”
TBT	Technical Barriers to Trade
TRAFFIC	The Wildlife Trade Monitoring Network
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UNCTAD	United Nations Conference on Trade and Development
UPOV	International Union for the Protection of New Varieties of Plants
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

11 Photographs



Photo 1: Locally harvested seashells on display for sale as beach memorabilia to tourists, a common sight in coastal communities in tropical countries. (Sabah, Malaysia, 2010, © Michael Hermann)



Photo 2: Wild cage birds for sale in an Indonesian market. (Bali, 2010, © Michael Hermann)



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Photo 3: Butterflies of the Nymphalidae family, available as pupae from *Alas de Colombia*, a Colombian marketing firm that has pioneered the commercial production of butterflies for release at weddings and other celebrations. *Alas de Colombia* has trained a rural community in the South of Colombia to farm the butterflies, an activity providing income in an area of civil strife and high unemployment (Source: www.alasdecolombia.com)



Photo 4: Herbal folk medicines on a rural market stall in Peru, with both introduced and native species. Herbal medicines are important in the poorer parts of the world where pharmaceutical drugs are unavailable or unaffordable. (2005 © Michael Hermann)



Photo 5: Wild fish of a perplexing diversity, is important as food and wildtrade income for riverine communities in the Amazon. (Pucallpa, Peru, 2005 © Michael Hermann)



Photo 6: *Capsicum* or chili pepper originated in South America, but in the wake of the European sea voyages spread throughout the world. In its secondary centers of diversity in Asia chili peppers have evolved into very distinct chemo- and morphotypes, with much flavour and color diversity, enabling food companies to develop new differentiated high-value foods and nutraceuticals. (Suwon, Korea, 2010 © Michael Hermann)



Photo 7: Camu camu (*Myrciaria dubia*) is a native Peruvian fruit, remarkable for the fact that it has the highest Vitamin C content of all plants. Camu camu is adapted to temporally flooded areas, and traditionally it is harvested from canoes that can access the partially submerged trees. No longer available from its wild habitat in sufficiently large quantities to satisfy international demand, camu camu is increasingly cultivated. Breeding programs to identify elite planting material are underway. (Ucayali, Peru, 2005 © Michael Hermann)



Photo 8: International demand for quinoa (*Chenopodium quinoa*, shown in foreground), an Andean grain suited for gluten intolerance sufferers, has led to the expansion of this native crop at very high altitudes in Peru and Bolivia. The picture shows a farmer field school attended mostly by women that aims to build capacity for organically certified production methods. (Puno, Peru, 2007 © Michael Hermann)



Photo 9: Owing to over-harvesting the bo khai liana (*Erythralium scanden*) is no longer available from its shrinking forest habitat and has therefore been taken into cultivation by farmers in mountainous North Vietnam. The distinctive taste and texture of bo khai appeals to urban gourmets and the cultivated shoots fetch high prices, thus stimulating expansion of the growing area. The pictured nursery in possession of a local Bo khai cooperative produces and sells live plants for the establishment of new plantations. (North Vietnam, 2010, © Michael Hermann)



Photo 10: High-value handbags made from snake skin, allegedly from farmed animals, on display in a boutique in Ubud, Bali (2011, © Michael Hermann).



Photo 11: Artistic Werregue basketry made by native Amerindians in the Choco (Pacific lowlands of Colombia) from the endemic palm *Astrocaryum standleyanum*. (2006, © Michael Hermann)