



## Value Chains for the Conservation of Biological Diversity for Food and Agriculture

Potatoes in the Andes, Ethiopian Coffee, Argan Oil from Morocco and  
Grasscutters in West Africa

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## List of Abbreviations

4C	Common Code for the Coffee Community
ADL	Association de Développement Local
ADS	Agence de Développement Social
ANCA	Association Nationale des Coopératives d'Arganeraie
AOC	Appellation d'Origine Contrôlée
AOP	Appellation d'Origine Protégée
CBD	Convention on Biological Diversity
CCTA	Coordinadora de Ciencia y Tecnología en los Andes
CESA	Centro de Servicios Agropecuarios
CGIAR	Consultative Group on International Agricultural Research
CIP	Centro Internacional de la Papa (International Potato Centre)
CNDA	Centre National de Développement et d'Alphabétisation
Dhs	Dirham
DPVCTRF	Direction de la Protection des Végétaux, des Contrôles Techniques et de la Répression des Fraudes
EACCE	Etablissement Autonome de Contrôle et de Coordination des Exportations
EAFCA	East African Fine Coffees Association
EC	Europäische Kommission
EEF	Europäischer Entwicklungsfonds
EU	Europäische Kommission
EUREPGAP	Euro-Retailer Produce Working Group Good Agricultural Practices
FFS	Farmer Field Schools
GBPF	Guide de Bonnes Pratiques de Fabrication
GEF	Global Environment Facility
GIE	Groupement d'Intérêt Economique
GTZ	Agence Allemande de Coopération Technique
HACCP	Hazard Analysis and Critical Control Point
IFPRI	International Food Policy Research Institute
IG	Indication Géographique
IIAP	Instituto de Investigaciones de la Amazonía Peruana
IIED	International Institute for Environment and Development
ILO	International Labour Organisation
INAO	Institut National des Appellations d'Origine
INIA	Instituto Nacional de Investigación Agraria
ITPGRFA	International Treaty for Plant Genetic Resources for Food and Agriculture
MACAB	Marketing Approach to Conserve Agricultural Biodiversity
NRO	Nichtregierungsorganisation
NM	Norme Marocaine
ODCO	Office de Développement des Coopératives
OMPIC	Office Marocain de la Propriété Industrielle et Commerciale
PAN LCD	Programme d'Appui à la Mise en Ouvre du Plan National de la Lutte Contre la Désertification
PCDA	Projet de Conservation et de Développement de l'Arganeraie
PRATEC	Proyecto Andino de Tecnologías Campesinas
RBA	Réserve de Biosphère de l'Arganeraie
SECO	Secrétariat d'Etat à l'Economie
SNIMA	Service de Normalisation Industrielle Marocaine (MIC)
UCFA	Union des Coopératives des Femmes de l'Arganeraie
UNDP	United Nations Development Programme

## 0 Summary

Value chains describe the work processes and actors involved in the production, processing, trade and end consumption of a product. In terms of development cooperation they offer various opportunities to improve the living and production conditions of the people involved and to conserve biological diversity for food and agriculture. Their suitability varies in terms of measures for reducing poverty and conserving biodiversity. There are, for example, differences in the type of social groups involved, access to the value chain and the distribution of power within the chains. The present study examines the value chains of the potato in its area of origin, the Andes; Arabica coffee in Ethiopia; argan oil in Morocco; and grasscutter farming in West Africa.

In the South American Andes around 4,000 varieties of potato are cultivated mainly by small, rural producers in marginal areas. These potato varieties contain a wide range of genetic properties which are relevant for current and future breeding purposes. Three sub-chains were identified within the potato value chain: the production of potatoes for immediate fresh consumption; the cultivation of potatoes for the manufacture of traditional products (*chuño*, *tunta*); and potato production for industrial processing (chips, crisps). Whilst all three sub-chains can be used to improve income, only the first two make any noteworthy contribution towards the conservation of biological diversity and are specifically suitable for small farmers. Only a few varieties of potato are suitable for industrial processing and the requirements with regard to quality, volume and contractual obligations mean that cultivation is primarily suitable for large and medium-sized farmers. With regard to the production of traditional products, as well as some completely new ones, on the other hand, there are several dozen varieties of potato which may be used, whereby small farmers are specifically suitable as suppliers. The greatest variety may be seen in the local markets for immediate consumption.

The centre of origin of Arabica coffee is Ethiopia, where there are several hundred varieties in existence. In Ethiopia, Arabica is produced from wild stock in forest systems or in semi-forest, garden or plantation systems. Most production comes from small farmers. There are numerous small farmers ranged against only a few international buyers in the value chain and, since the abolition of coffee quotas, prices have now hit rock bottom following a high. Support measures in Ethiopia since the 1970s initially focused on the breeding of CBD-resistant varieties, the improvement of access to the producers (roads) and the development of washing stations. Current measures aim at the conservation of biodiversity, increasing quality, reducing costs and promoting marketing. To achieve this, the provision of technical advice to the farmers has been improved, tree nurseries are being developed, coffee forests protected and marketing promoted. The latter also includes various certification initiatives (Fair Trade, Rainforest Alliance, Utz Kapeh), which use the uniqueness of Ethiopian Arabica and adherence to social and ecological standards to achieve higher prices. The 4C initiative is a new mainstream attempt at improving the value chain, which brings together as many actors in the value chain as possible, in order to develop a common concept which is in the mutual interests of producers, traders, processors and retail sellers. Since it is the small farmers who cultivate the variety of coffee types and who form the vast majority of Ethiopian coffee producers, measures which support these producers are relevant to both poverty reduction and the conservation of biodiversity.

Argan oil is pressed from the nuts contained in the fruit of the argan tree. It is traditionally used in food and cosmetics. The argan tree grows in only a few areas of Morocco, most notably the Arganeraie, and the tree population is being reduced through over-aging and deforestation. Two sub-chains have been identified in the argan oil value chain: (i) hand-pressed and (ii) mechanically-pressed oil. Both chains generate additional income from the production of argan oil, whereby interest is created in the conservation of existing populations, and the establishment of new plantations. However, for the production of mechanically-pressed oil, jobs and thus part of the profit, are transferred to urban areas and the rural regions are left only with the nut production. With regard to hand-pressed argan oil, on the other hand, both the nut harvest and the processing take place in rural areas. As such, measures to promote hand-pressed oil production contribute more directly to reducing poverty. Measures already implemented included training the Berber women involved in production and processing, and helping them to organise themselves; the planting of new plantations; and improving the quality of the oil production. It is hoped that through certification and partnership with international buyers, higher prices may be achieved. By means of a framework plan, the Arganeraie has been recognised as a UNESCO biosphere reserve.

Grasscutters live wild in the savanna and forest areas of Western and Central Africa. Because of the pressure of hunting and the spread of pasture and human settlement, the wild population is in decline. To reduce pressure on the wild population and to avail of the animal's high economic potential, the suitability of these animals for domestic production has been continuously improved since the 1980s by means of systematic breeding and farming experiments. With the support of various donors, grasscutter farming has meanwhile become widespread in Benin and Ghana. It can be practised both in urban and rural areas after introductory training and start-up investment. For particularly poor households, however, access is only possible if the costs of training and initial expenses are borne by a third party. Because of the huge demand for grasscutter meat and high prices, grasscutter farming is very profitable. Whether farming will achieve a stabilisation of the wild population remains to be seen.

The following measures have been successfully implemented in several of the value chains examined:

- the training of producers and their organisation into production and marketing associations;
- cooperation with research institutes, at least at the outset;
- improved harmonisation of supply and demand; the promotion of marketing measures and quality by means of certification; the development of alternative products and increased efficiency;
- the improvement of regulatory and standards frameworks (reduction of legal obstacles, introduction of technical standards, analytical procedures, statistics, market information);
- parallel measures for the conservation of genetic diversity both *in situ* and *ex situ*;

The suitability of value chains for achieving the aims of development cooperation, in particular poverty reduction and the conservation of biodiversity, depends on various properties such as:

- the extension of the value chain to merely local and national level or, additionally, to international level;
- the breakdown of the value chain into sub-chains with varying effects on poverty reduction and biodiversity;
- distribution of power within the value chain and the willingness of those involved to reconcile their various interests;
- the number and composition of those involved (poor households, men-women) and their access to the value chain (investments, know how);
- the direct contribution to the conservation of biological diversity.

The following table provides a summary overview of the properties of the four value chains examined.

Criterion	Potato	Coffee	Argan Tree	Grasscutter
<b>General Criteria</b>				
Geographical extent of the value chain	local, national, regional	national, international	local, national, international	local, national, regional
Breakdown of value chain into sub-chains	high	medium	medium	low
Value chain driven by	demand	demand	demand	supply
Cultural roots	strong	strong	strong	none
Use of traditional knowledge	+++	+++	+++	-
Number of actors in the chain on the production side	+++	+++	++	+
Number of actors in the chain on the buyer side	Consumers:+++ Industry: +	Roasters: + Consumers: +++	Processors: + Consumers: +	+++
Proportion of female beneficiaries	+	+	+++	-
<b>Economic Criteria</b>				
Income enhancement potential	+	++	+	+++
Initial investment required by producers	-	+	+	++
<b>Ecological Criteria</b>				
Biological diversity affected	approx. 4,000 varieties	1 species with several hundred varieties	1 species with a few varieties	2 species (T. swinderianus, T. gregorianus)
Difficulty of conservation in gene banks	+++	+++	+	+++



## 1 General Context

Value chains (commodity chains) describe the organisational and institutional networks formed with regard to a specific product and the local, national and international actors involved. There are interfaces within a value chain where intensive labour and production processes take place, creating surpluses and profits<sup>1</sup>. The allocation of financial, material and human resources along the value chains and exchange at the individual interfaces are largely determined by the value chain's decision-makers. The distribution and implementation of decision-making power along the value chain is described as governance, the quality of which also depends on the transfer of information and knowledge. Thus the main buyers can promote the abilities and know how of their suppliers to a greater or lesser degree and influence their performance.

In general, one may differentiate between producer-driven and demand-driven value chains. A typical producer-driven chain would be capital and technology-intensive car production, which is carried out by large, integrated companies. Land and forestry products, such as coffee and wood, usually belong to the demand-driven chains, in which large trade and distribution chains represent the buyers for a wide number of more or less organised (small) producers.

The best way to preserve naturally occurring plant and animal species and those sub-species, types and races arising out of environmental conditions and human intervention, used, or potentially usable by humans, is to create and maintain a market value for them. As such, value chains can also be used for the conservation of genetic diversity in agriculture and thus contribute to guarantee and improve both food security and the raw material basis of current and future generations. In terms of evaluating individual value chains it is important to know the interfaces occurring along the chain, which resources need to be used, what surpluses and profits can be created and which power structures control the value chain. With these facts it is possible to determine which support measures are most suitable and where they should be applied for maximum effect.

The present study describes and compares the value chains of four branches of agro-industry, which are making an important contribution to the conservation of genetic diversity for food and agriculture. The production, marketing and further processing of (i) potato types in the Andes, (ii) Arabica coffee in its original homeland of Ethiopia, (iii) argan oil production in Morocco and (iv) the rearing of grasscutters in West Africa were examined. In order to draw conclusions which are valid across the board, examples were chosen from various regions (Maghreb, East and West Africa, South America), from agriculture and animal farming and with various uses: coffee as cash crop and luxury article; argan oil as an industrial raw material; potatoes and grasscutters as foodstuffs. The analysis was carried out on the basis of available project-based and general literature and was fine-tuned and enhanced through discussions with experts and those involved in the various areas.<sup>2</sup>

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<sup>1</sup> Taylor (2004), P. 130

<sup>2</sup> see Imprint

## 2 Potato Diversity in the Andes

### 2.1 Potatoes in Context

An unusual demonstration took place in May 2005 on the streets of Huancayo, a town in the Peruvian highlands. Farmers and students, as well as the managers and staff of both *cantinas* and upmarket restaurants were demonstrating against the use of Dutch and Canadian potatoes in the mushrooming fast food sector. It was said that the many native types of potato were hardly being used in these restaurants and the farmers of Peru, one of the potato's home countries, were having difficulty disposing of their produce, being forced to sell at prices which barely covered their costs.<sup>3</sup> This demonstration showed two things:

On the one hand, that there was a discrepancy between local supply and demand and, on the other, that the public at large had recognised that the diversity of indigenous potato varieties was a biological and cultural heritage which should be conserved and better used in economic terms.

The potato originated in the Andes of South America. It is one of the few important cultivated crops which can tolerate the difficult climatic conditions of the Andean highlands, with wide ranges of temperature, regular frost, intense sun and regular periods of drought. After the discovery of America, the potato quickly spread to the rest of the world and, especially in Europe and Asia, became one of the most important sources of food. Today in the potato's indigenous region, a unique range of varieties is cultivated and used. Globally speaking, however, Latin American potato production plays only a minor role. Worldwide, something over 300 million tons of potatoes are produced every year. The world's leading producer is China with 66 million tons; in Germany around 11 million tons are produced whilst in Peru the figure is around 2.5 million tons. Colombia and Argentina have similar levels of production.

#### The Potato Market

Although potato consumption is considerably higher in the industrialised countries than in the developing countries, European potato production has declined slightly while it has been greatly increasing since the 1990s in Asia, Africa and Latin America and has gained importance as a source of food and income. According to IFPRI and CIP forecasts, the relative importance of the potato as a foodstuff in the developing countries will at least remain stable, but will more probably continue to increase. Whilst in the 1960s less than 30 million tons were produced in the developing countries, production has now risen to over 100 million tons whereby the growth rate has accelerated in the last decade, to clearly overtake other important foodstuffs such as maize, bananas, wheat and rice.

Potatoes have a relatively high water content and are quite heavy when measured against their value. They are therefore mainly traded in a geographically small area. As such, import and export are only relevant in terms of overcoming seasonal shortages, making seed available or, with regard to specific varieties and

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<sup>3</sup> Niezen (2005)

qualities, for consumption as illustrated by the fast food chain example mentioned above.

The potato is much more important as an internationally traded commodity in Europe than in Latin America. Whilst the Netherlands and Germany each export about 1.5 million tons of potatoes per annum and import a similar quantity, Peru exports only 3,500 tons, Colombia 28,000 tons and Argentina 16,000 tons. Although frozen potatoes and/or potato products with a value of US\$ 2.7 million were imported into Peru in 2004, potato imports represent "a symbolic rather than a real" proportion of the market<sup>4</sup> and are also very low in the neighbouring countries. In Bolivia, the maximum distance potatoes are transported rarely exceeds 250 km.<sup>5</sup>

In Latin America, increasing production is largely absorbed by the local markets, whose potato turnover is steadily rising. Bolivia, for example, is 99.7% self-sufficient with regard to potato supply.<sup>6</sup> Unlike the unstoppable rise in potato production in Asia, the increase in production in the Andean countries has been declining again in recent years, as potato cultivation has been continually pushed out to marginal locations with lower productivity.<sup>7</sup>

### **Biology and Diversity in the Andes**

It is estimated that there are around 4,000 varieties of potato worldwide, of which over 2,000 are cultivated in the Peruvian Andes alone. They are red, blue or black, occasionally with yellowish or white flesh and of various shapes.

Well over 90% of the potatoes produced worldwide, including the varieties known in Europe, no longer have much in common with the original properties of the potatoes cultivated in the Andes. Most of the potatoes used today would no longer be able to tolerate the weak soil and difficult climate. Instead, they have properties which make them ideally suitable for the production of important, standard goods such as potato starch, chips or crisps.

On the other hand, most of the varieties of potato still used for traditional purposes in the Andes, which flourish despite the difficult conditions at an altitude of between 3,500 and 4,200 metres, are bitter and cannot be eaten without processing. They have been selected by the indigenous farmers over centuries for their taste, texture, shape and colour and can be cultivated with minimal plant protection.

The cultivation of these varieties has declined noticeably in recent decades and the farmers are increasingly betting on "yellow" potato varieties with which consumers are familiar and which are easier to market. The worldwide demand for potato products is therefore being covered by an increasingly small number of varieties whereby many of the older varieties are threatened by extinction. Already today, some can only be found in gene banks.

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<sup>4</sup> Niezen (2005)

<sup>5</sup> Valdivia (2003)

<sup>6</sup> Valdivia (2003)

<sup>7</sup> CIP

## Types of Processing

The potato is eaten whole directly by the consumer and is also processed industrially. Traditionally, in the home, the whole tuber is used or is turned into mashed potato, used in soups, fried, etc. In Germany, however, about 50% of the potato harvest is already processed when it comes to the consumer's table.<sup>8</sup>

In the USA, only about one-third is sold fresh, whilst 33% comes on to the market in the shape of frozen potato products. A further 22% is processed into crisps or dried products, 9% is used by the farms themselves and 5% is used for animal fodder or as seed potato.<sup>9</sup>

Although the majority of the Latin American population buys its potatoes in the form of fresh tubers, or in the traditionally preserved forms of *chuño* or *tunta* in Peru and Bolivia too, however, consumption of processed convenience and fast food products is continuously increasing. Owing to a growing urban population and greater participation of women in working life, there is a trend towards increased consumption of products such as potato crisps, ready-made chips and packet products. In Colombia, around 12% of the potato crop is industrially processed, mainly into crisps or ready-made chips. This trend is linked with the specialisation of increasing industrial processing and a growing trade in potatoes and potato products.

## Quality Requirements for the Potato

Depending on the end product, potato quality requirements vary greatly. Whilst households which use the entire tuber may look for a broad palette of characteristics, the processing industry has very specific requirements with regard to quality, which has a major impact on prices.

Amongst the most important external features of quality are size, shape, skin thickness and depth of the eyes. These characteristics have a bearing on the effort required during the mechanical peeling process and - especially with regard to the production of potato crisps - on the size and shape of the end product.

Water and sugar content are amongst the most important internal quality characteristics. A low water content means a high starch yield. Sugar content and composition are responsible for the browning and taste of deep-fried and fried products. High glucose, fructose and saccharose content leads to a dark-brown to black end product with a bitter taste, and potatoes with these features are therefore rejected by the processor and the consumer.

These quality features depend on both variety and conditions of cultivation. Thus in Colombia, of the 400 varieties examined, only 5 were found acceptable by the processing industry for the manufacture of fried products. For these 5 varieties in turn, very specific cultivation criteria have to be fulfilled before they are deemed acceptable. Thus the texture of the soil is important for the development of suitable shapes. During the vegetation period very low temperatures should be avoided as these lead to increased sugar values, rendering the tubers unsuitable for processing.

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<sup>8</sup> CMA

<sup>9</sup> AMRC

## 2.2 Functions and Actors in the Potato Production and Processing Value Chain

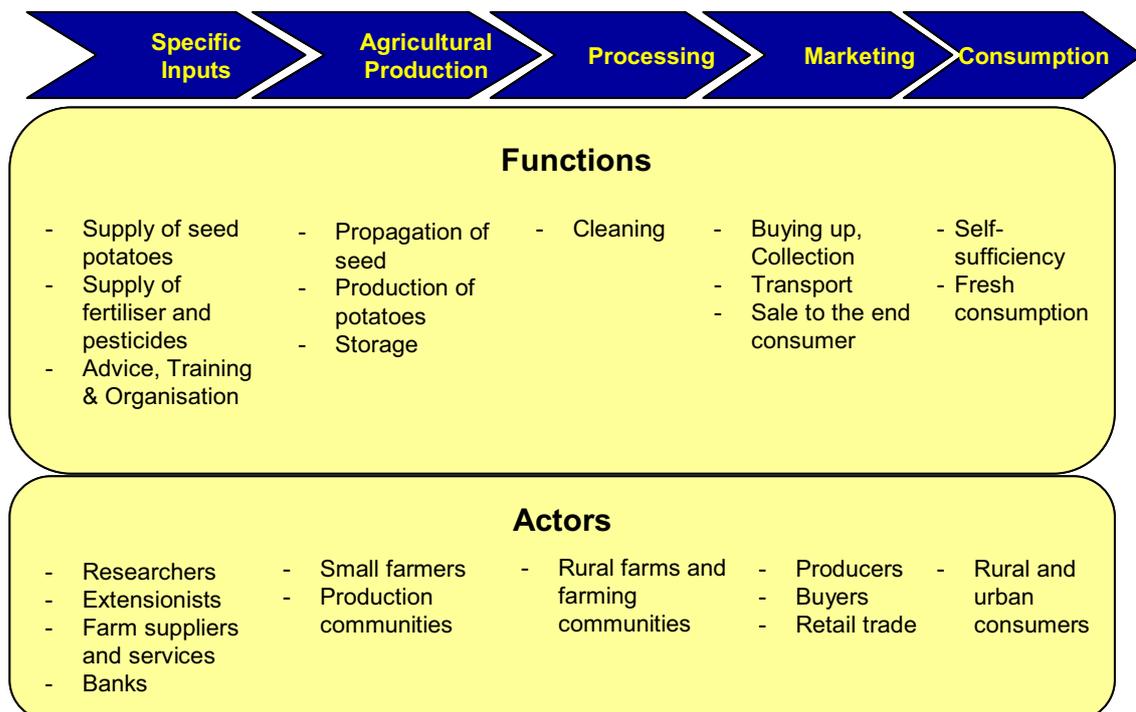
As described above, a wide range of end products is manufactured from the potato, each having very specific requirements of the commodity itself and involving a variety of different players. As such, various value chains, with quite distinct differences, exist alongside each other.

In order to make a systematic examination easier, three different typical value chains are described below.

### Value Chain: Potatoes for Fresh Consumption as Loose Goods

In this value chain the potatoes are produced by the farmers for direct, fresh consumption by the end consumer (Fig. 1). The potatoes produced are collected by the buyers who travel to the rural markets, and are sold through intermediate traders or directly to wholesalers and retailers. They in turn sell the potatoes to the consumers, who may be households, restaurants, *cantinas* or small cookshops. Ahead of production, there are seed, fertiliser and pesticide suppliers and a few other resources. Between production and end consumer, there may be simple cleaning and sorting processes, which may be carried out by farmers, the buyers or the traders.

Fig. 1: Value Chain for Fresh Potatoes in Peru

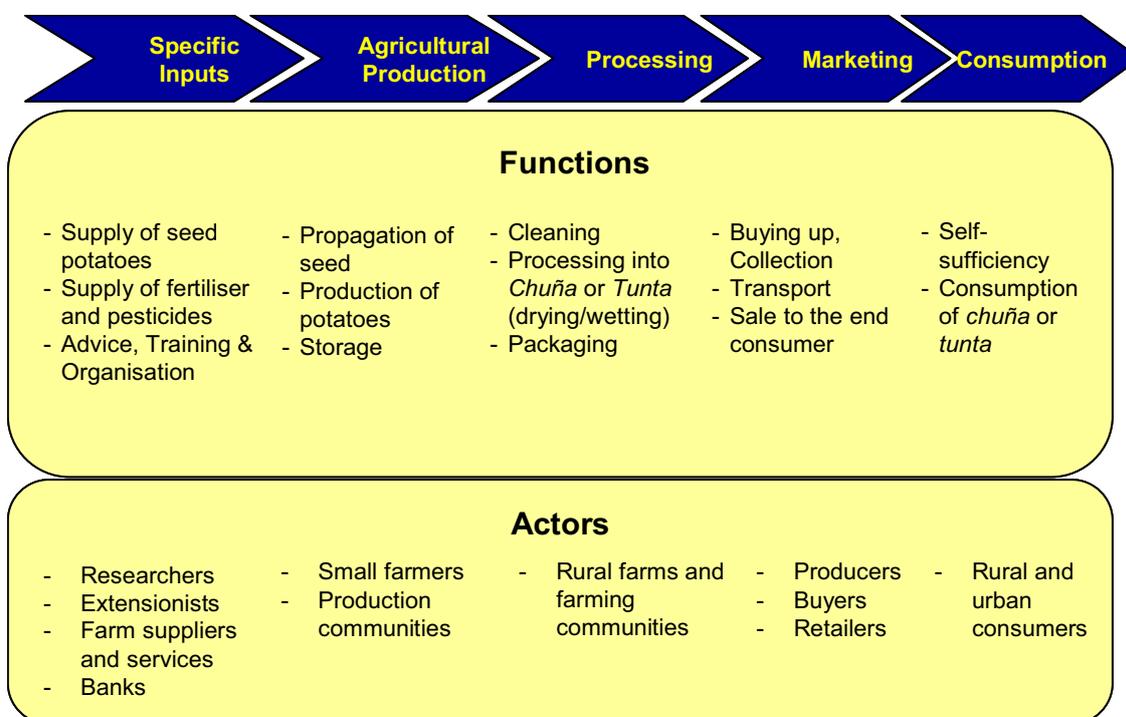


Individual links of this chain can be bypassed. For example, the farmers may themselves produce resources such as seed or organic fertiliser. Parts of the marketing process may also be bypassed by means of direct trading between retailers and producers. There is no noteworthy processing involved on the way to the end consumer.

### Value Chain: Traditional Processing into Chuña and Tunta

Most varieties of potato which have adapted to the extreme climatic conditions of the Andean highlands and are traditionally grown there by the farmers, are bitter potatoes. Not only because of their unpleasant taste, but also because they contain indigestible substances, they have to be treated by freezing and drying, before they are suitable for consumption (Fig. 2). For this reason, the highland farmers have for centuries been using the night frosts and strong sun to treat the potatoes. To produce *Chuño*, the bitter potatoes are frozen by the frosts for several nights and are then dried in the sun during the day. The manufacturing process for *tunta*, which is a very similar product, differs in that some of the bitter elements may be better eliminated by occasional wetting of the potato. The end products are not only easily digestible but remain edible for months or even years.

Fig. 2: Value Chain: Potatoes for Preparation as Chuño and Tunta

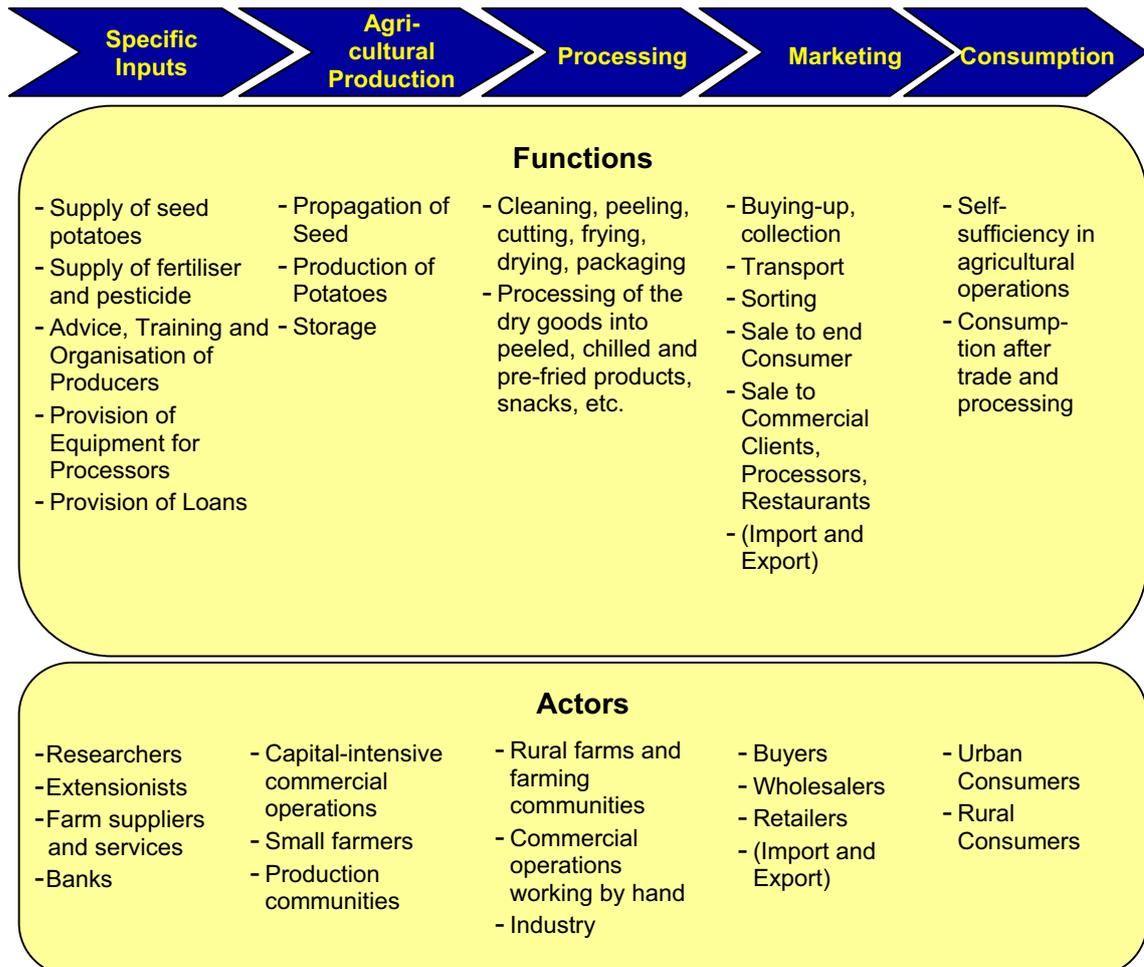


Both products are predominantly used for personal consumption, but as dry goods may be transported and handled fairly easily. Traditionally, they were used for bartering goods from the lowlands. A study by the *Fundación PRIONPA* estimates that in Bolivia's Altiplano region around 5,600 family-owned operations produce over 5,000 tons of *chuña* and *tunta* with a value of about 3.3 million US\$, giving each family an average income of approx. 550 US\$. In Peru it is thought that the production volume is even somewhat higher. This traditional process therefore still has great significance for the rural population and is closely linked with the conservation of diversity in traditional indigenous varieties.

### Value Chain: Potatoes for Processing into Potato Crisps and Chips

As with the previous value chains, the suppliers and then the buyers (Fig. 3) stand between the producers and the end consumers. The suppliers and buyers sell the potatoes directly to the processing industry or, via intermediate traders, to smaller operations processing by hand, from where the goods may also go to wholesalers and retailers and then finally from there, to the end consumers.

Fig. 3: Value Chain: Potatoes for Industrial Processing



With regard to the manufacture of pre-processed goods such as peeled, chilled or pre-fried products, the buyers are often restaurants, where the products will then undergo further processing.

In this value chain there are several marketing and processing phases, e.g. the sale of the potatoes between producers and processors, followed by sale between processors and restaurants and between restaurants and end consumers. Processing steps occur between producers and processors (cleaning, sorting), with the processors (e.g. peeling, pre-frying) and in restaurants (end processing).

Only a few potato varieties can be used within this value chain. However, in this instance "variety" does not mean a strict biological variety. Neither the households nor the processors can differentiate between all the different varieties. In Bolivia, for

example, there are only 13 distinct commercial varieties. This contrasts with the hundreds of different potato varieties which the small farmers cultivate and are able to name and describe.

The "varieties" *Chuña* and *Tunta*, which cover a wide number of biological types, belong to the 13 commercial varieties which are suitable for the manufacture of the products of the same name (see chapter above). Other so-called varieties such as the *Holandesa desconocida* or the *Desconocida Maggi* are equally not varieties in a biological sense but are groups which more or less resemble one particular variety or have specific characteristics. Alongside these, there are the truly biological varieties such as *Desirée*.<sup>10</sup> What determines the acceptability of the potatoes for the processors are how they cook and fry. Only 2% of Peru's potato production goes to industrial processing. A considerably larger proportion of potatoes which have only been peeled, cut and packaged, goes to small cookshops and restaurants.

Value chains which tie in to international trade play almost no role and should therefore not be examined further. The fast food chains, who have a decisive influence on the global potato market are, of course, expanding in Latin America as well. However, contrary to public perception, all of these chains combined use only 0.5% of the volume produced nationally. Even if they could be persuaded to buy more of the national product, the effect on trade as a whole would be small.

Potato products in the form of ready snacks are being imported as well, but in terms of quantity are also negligible. Nevertheless, this area presents small but interesting commercial opportunities for indigenous products and varieties.

## 2.3 Support Measures and Findings in the Area of Potato Production and Processing

In the Andes, the potato is not only one of the most important foodstuffs but, with its incredible range of varieties as well as its traditional processing methods and end products, also an important cultural asset. Therefore there are a number of approaches aimed at promoting potato production and conserving genetic diversity in the Andes region. These funding approaches are either in the individual countries or operate as transnational initiatives on the part of Peru, Bolivia and Ecuador.

The aims of the support programmes are always

- to create income for small farmers,
- to promote biological and cultural diversity,
- to improve the food security situation for poor sections of the population.

To achieve these aims, there are approaches ranging from individual interventions to complex measures for improving the entire value chain. The following describes some of the participants, programmes and their various approaches.

### Parque de la Papa – the Potato Park

In the the supposed centre of origin of the potato, in a high valley south of Pisac in Peru, six Quechua villages have joined together as the *Parque de la Papa* in order to jointly farm their common land of around 8,600 hectares. Their aim is to conserve the

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<sup>10</sup> Guido & Mamani (2000)

landscape, their means of existence and their traditional way of life, as well as to resuscitate traditional rights and institutions. Around 1,200 different varieties of potato are named and used in this valley. A typical family farm may have up to 300 different varieties of potato.

With support from the IIED *Sustaining Local Food Systems Agrobiodiversity and Livelihoods Programme* and the Rockefeller Foundation an attempt is being made not only to conserve this astonishingly high number of varieties, but also to reintroduce further varieties to the region. An agreement for the reintroduction of 206 varieties of potato has already been reached with the International Potato Centre (CIP) (see summary in the text box overleaf). These agricultural activities are backed up by reforestation projects and efforts towards achieving dietary improvements.

The six villages have acquired the status of a protected area. Through the development of agro-tourism and a visitor centre with potato exhibition and restaurant, additional jobs and income have been created. Improved storage facilities make marketing easier while the sale of mixed potato varieties as brand products via the country's biggest supermarket chain has diversified sources of income and aims to ensure the long-term existence of the programme.

### **The "In situ" Project**

The *Conservación In situ de los Cultivos Nativos y sus Parientes Silvestres* Project - "*In situ*" for short - has taken a similar route to the *Parque de la Papa*. Set up in 2000, as an initiative of GEF and UNDP, it is being implemented by six national organisations:

- Instituto de Investigaciones de la Amazonía Peruana (IIAP),
- Instituto Nacional de Investigación Agraria (INIA) with 8 test stations
- Proyecto Andino de Tecnologías Campesinas (PRATEC) with 10 member organisations
- Coordinadora de Ciencia y Tecnología en los Andes (CCTA) with 4 member organisations
- Asociación Arariwa para la Promoción Técnico Cultural Andina
- Centro de Servicios Agropecuarios (CESA)

**Agreement on the Return, Re-establishment and Conservation of Biodiversity of the Native Potato and the Related Indigenous Knowledge**

between the *Asociación de Comunidades del Parque de la Papa* and the *Centro internacional de la Papa (CIP)*

**General Statement:**

- The conservation of biodiversity is of paramount importance.
- This agreement is based on the terms of the Convention on Biological Diversity (CBD).
- This agreement forms an alternative to the usual in-situ and ex-situ strategies for the conservation of biodiversity.

The text of the agreement is very general and refers to resources and traditional knowledge. In the sub-section "Alcances" the meaning is restricted to potatoes and related knowledge.

**Goals** of the agreement are:

- to promote the use and the conservation of "maximum diversity",
- Retention of genetic resources and knowledge in the keeping of the indigenous communities and the prevention of the proclamation of private rights as intellectual property.
- To set an example in showing a way between ex-situ and in-situ strategies.
- To promote respect for biological resources and the rights and responsibilities of the indigenous communities.

**Responsibilities:**

The communities („el Parque“) undertake to:

- permanently make available the genetic material for distribution and use by the members.
- guarantee access to genetic material supplied.
- keep CIP informed on an ongoing basis.
- cooperate with regard to studies and investigations.

CIP offers (depending on financial resources) to:

- make genetic material available.
- guarantee that plants are free of disease and pests.
- provide advice on the conservation, propagation and cultivation of the varieties made available.

Together the two parties undertake to:

- conserve and propagate the varieties for the use of third parties;
- jointly seek financing;
- jointly undertake public relations exercises;
- mutually keep each other informed on an ongoing basis;
- produce progress reports and - where appropriate - make these available to CBDm, FAO or others;
- fairly distribute the benefits or profits from this programme;
- integrate parts of this agreement or findings arising out of this agreement into possible future standards for communal or farming rights.

Note: The original agreement is 9 pages long.

(Source: [http://www.grain.org/brl\\_files/Convenio%20CIP.pdf](http://www.grain.org/brl_files/Convenio%20CIP.pdf))

The initiative's aim is to conserve the diversity of twelve cultivated plant species - including the potato. One goal is to conserve agri-biodiversity through improved cultivation techniques. It is intended that agricultural organisations should be reinforced and awareness of the ecological, cultural and nutriphysiological values of traditional crops be increased. The political and legislative framework should be adjusted to contribute to the conservation of diversity. The marketing of traditional crops in local, national and international markets should be promoted.

## The Papa Andina Project

One of the few projects which specifically considers the entire value chain and uses it for interventions, is the Papa Andina Project. The project looks specifically for bottlenecks in the value chain which can be removed by means of relevant support measures. In some instances, new products are developed, aimed at conserving the diversity of potato varieties and creating secure, more profitable or new sources of income for small farmers.

## The Centro Internacional de la Papa (CIP)

The above-mentioned projects of course cooperate with the agricultural authorities of the respective countries and the farming organisations. However, without the specific know how and the contribution from the International Potato Centre (*Centro Internacional de la Papa - CIP*), these approaches would not be possible.

The *Centro Internacional de la Papa* was established in 1971 as an independent scientific organisation. It is one of 16 international research and training centres supported by the CGIAR.

The goals of the CIP are poverty reduction and food security through research and funding activities with regard to potatoes, sweet potatoes and other root and tuber vegetables, as well as improved management of cultivation methods in the Andes. The Centre's headquarters is "La Molina", close to Lima.

The CIP gene bank, from which practically all known varieties of potato can be obtained, is particularly important for the conservation of potato diversity. The CIP also conceived the *Marketing Approach to Conserve Agricultural Biodiversity (MACAB)*<sup>11</sup> which served as the orientation guideline for numerous promotion approaches and was then further fine-tuned.

## Support Approaches

The various activities and approaches for promoting potato production in terms of conserving genetic diversity are once again summarised for the various projects below. The following chapter examines in detail the impact of individual approaches.

### Support in the Area of Public Relations and Creating Awareness

- ➔ 30th May has been declared the official "Day of the Potato" (*Día de la Papa*).
- ➔ Potato varieties are being registered and described in detail (inventorising),
- ➔ The various ways in which land is being used are being mapped.
- ➔ Agro-biodiversity fairs where the varieties are exhibited are being organised and cooking competitions held.
- ➔ Exchange visits between farmers from different provinces are being organised.
- ➔ School gardens are being set up by the children and courses on the importance of biodiversity are being held at primary schools.

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<sup>11</sup> Bernet (2004)

### **Safeguarding Rights**

- ➔ Designation of a protected area within the framework of the *Parque de la Papa* project.
- ➔ Safeguarding of farmers' rights as the owners of old varieties and of expertise.

### **Improvements in Production**

- ➔ Farmers are given support in organising themselves into associations and committees.
- ➔ Access to good, healthy seed is being improved.
- ➔ Old, lost varieties are being made available again by the gene banks.
- ➔ Seed production and marketing by the farmers themselves is being supported.
- ➔ Resistant varieties are being identified.
- ➔ The provision and use of fertilisers is being improved.
- ➔ Improved methods of adapted and integrated plant protection are being introduced.

Farmer field schools (FFS) are one method by which these measures are being implemented. Handbooks and advisory approaches are being developed.

### **Post-Harvest Improvements in Storage and Usage**

- ➔ Marketing conditions are being improved and warehousing losses reduced through the construction of appropriate storerooms for the farmers.
- ➔ Improved commercial storage and cleaning increases the market quality of the products.

### **Improvement of Marketing; Exploration of New Marketing Potential**

- ➔ The identification of niche markets and forms of production where small farmers have a competitive edge, create specific advantages for them.
- ➔ Market studies, market surveys and technology fairs improve exchange between the actors and those gathering and providing information.
- ➔ Amalgamation of farmers into marketing organisations strengthens the producer's side.
- ➔ Networking of producers and processors through the organisation of workshops.
- ➔ Development of new marketing channels opens up new income sources and reduces dependency on existing buyers.
- ➔ Establishment of specialised sales points creates jobs and income.
- ➔ The development of new products (multi-coloured potato crisps) diversifies the product range.
- ➔ Improving the quality of traditional products (variety-rich selection of potatoes, reduction of foreign matter content, etc.).
- ➔ Emphasis on the special traditional and cultural significance of individual varieties ("gift potatoes").

- Documentation of and fresh emphasis on the particular suitability of specific varieties for certain end products, e.g. for traditional freeze-drying in the cold highlands.
- Simplified access to loans improves ability to plan and facilitates investment.

The numerous support measures presented apply to various levels of the value chain, whereby the effects achieved are discussed in the following chapter.

## **2.4 Results and Impact of Support Measures**

Visible results of the above-mentioned activities and approaches are:

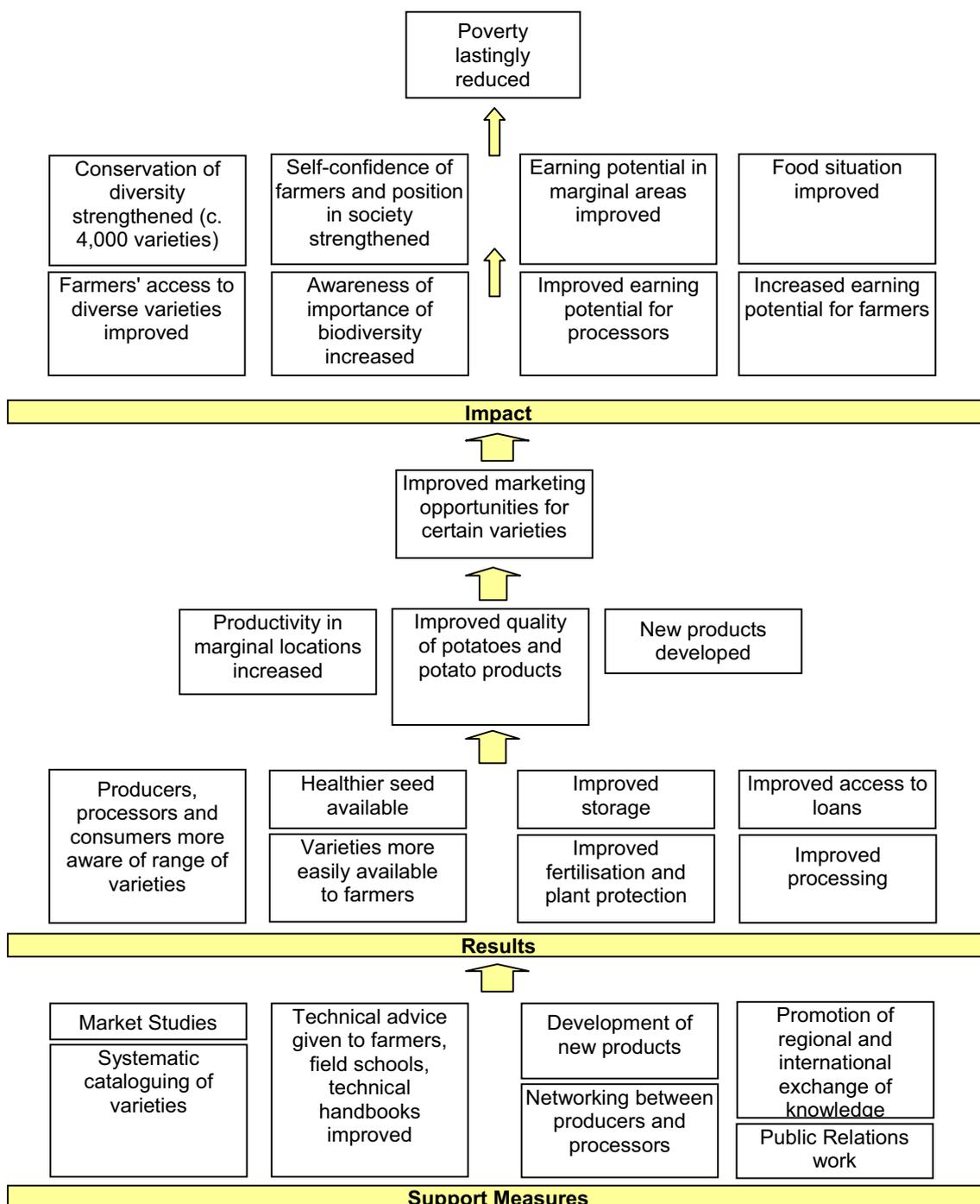
- an increased awareness of both the unique diversity of potato varieties and their endangerment.
- creation of new marketing channels for the potato and development of new products.
- increase in the quality of the product and the improvement of traditional products by means of advances in cultivation, processing and storage.
- an improved institutional and legal framework for the conservation of diversity.

The extent to which these results have contributed to reducing poverty and conserving biological diversity is discussed in detail below. An overview of the cause-effect structure is shown in Fig. 4.

### **Sensitisation and Creation of Awareness**

Today, producers and consumers are much more aware of the importance of both diversity in potato varieties and diversity of cultivated plants in general, than they were a few years ago. After years of being considered outdated and uninteresting, traditional potato production is now recognised as essential to the conservation of biological diversity and as a cultural asset. National commemoration days and numerous press reports bear witness to this. As such, the conditions for conserving the diversity of traditional varieties have been improved. This awareness also facilitates the creation of new market openings for different varieties. The different varieties and their characteristics are now better known commercially.

**Fig. 4: Impact Pathway: Potatoes in Peru**



### Rights of Indigenous Producers Safeguarded

By means of an agreement between six communities of the Potato Park and the CIP<sup>12</sup> - the first of its kind in Peru - an important legal milestone was set, returning and securing a part of their rights and their property to the indigenous groups. Under the

<sup>12</sup> Text in Asociación Andes (2005)

terms of this agreement, the Centre's gene bank returned certain varieties with all of their associated rights to the farmers. The agreement aims to ensure that the old potato varieties and the knowledge associated with them remain available to the indigenous population in the long term and do not become the object of private patenting as intellectual property rights. IIED praised the agreement because under its terms the gene banks were reopened and biological diversity returned to the farming communities.<sup>13</sup>

### Cultivation and Storage Improved

Traditional know-how has been safeguarded and made available, through the systematic description and documentation of the varieties and their associated methods of cultivation and processing, especially by the CIP. The improvement in seed propagation provides better quality seed as the basis for higher production and better quality.

The improvements in plant protection and fertilisation allow the groups involved in the project to produce end products of a better quality and thus achieve higher prices. Improved storage also makes a contribution in that the availability of the potatoes and rural products (*chuño* and *tunta*) is extended over a longer period of time. This in turn improves marketing potential, guarantees a higher price and also improves food security in rural areas.

### Processing

It has been possible to achieve individual improvements in the rural processing and hand processing of potatoes. The resulting improved quality of the processed goods and the reduction of costs and losses has led to an improved market position for the producers and the processors.

### Marketing

As mentioned at the outset, there is already a supply surplus on the national potato market. As such almost all efforts aim at better harmonising local supply and demand with regard to potatoes and to potato products. General progress in improving earning potential has been achieved through the networking of producers with the processors and through the introduction of higher quality across the board. However, this has not always led to any conservation of biodiversity as the following examples demonstrate:

- ➔ To facilitate **the farmers' access to high quality industrial production**, the farmers are supported in offering raw materials of a quality and quantity, such as are required by industry for the most common processed products such as potato starch, chips and crisps. It has already been mentioned, however, that this led to the cultivation of only a few varieties and the marginalisation of less profitable ones.

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<sup>13</sup> Bridges (2005)

- ➔ The **production of potato starch** creates income for farmers. Peru annually imports up to 15,000 tons of potato starch. Assuming that 8 kg of potatoes are required to produce 1 kg of starch, this would correspond with demand of up to 120,000 tons of potatoes, i.e. around 5% of national production. As such, the Ministry of Agriculture has announced the development of an industry for the production of potato starch.<sup>14</sup> It is expected, however, that if such production ever goes ahead, only a limited number of potato varieties will be used, and these will very probably be produced in favoured locations. As such, this industry would have barely any effect in conserving the diversity of potato production of the small farmers in the Andean highlands.
- ➔ The manufacturers of **potato crisps and chips** set the highest standards with regard to the quality of the potato, with very narrow limits for both external appearance and content. However, since the industry pays high prices, the Papa Andina Project, for example, made considerable efforts to facilitate the small farmers' access to this particular market. It was indeed possible, with some improvements in plant protection, the organisation of the farmers and the creation of an institutional platform between small producers and industry, to create access for the farmers of several villages. The consequence, however, was that they were forced to focus on only two varieties of potato and diversity on the land declined. In addition, the bigger farmers with their more favourable production conditions retained the upper hand in the long-term. For the industry, the small farmers were only of interest in terms of covering supply shortfalls.<sup>15</sup>
- ➔ The **development of high-quality branded goods** offers further potential. As described above, loose potatoes are often only available in Peru as a mixture of varieties. Thanks to extensive support from the CIP, the Papa Andina Project was able to create a brand product, whereby quality potatoes are now packaged in bags. The tubers are either packaged for wholesalers in 50 kg sacks, of a single variety and with a quality guarantee or, as *T'ika Papa*, are sold in consumer-friendly package sizes via the country's biggest supermarket chain. However, only around 20 varieties of the so-called "sweet" potato are suitable for this particular marketing strand. It may therefore be promising in terms of generating income but makes no contribution to conserving the diversity of the bitter potato. The situation is similar with regard to the newly-developed instant potato mash made out of indigenous potatoes or the branded "Peruvian Golden Potato", which is exported and is slowly gaining recognition abroad.

The long-lasting, rurally processed products, *chuño* and *tunta* too, are available only in varying levels of quality. It would therefore be interesting to introduce brands with a fixed quality standard for these dried goods, as there would then be a use for the numerous bitter potato varieties. The "La Llaveña" brand has been developed for *Tunta* with the support of the *Ministerio de Producción*. The Papa Andina Project also markets high quality *chuño* and *tunta*. Marketing of these traditionally processed products is particularly interesting from a biodiversity viewpoint. In practice, however, it has been

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<sup>14</sup> Niezen (2005)

<sup>15</sup> Bernet (2002)

seen that in fact only a few varieties are used for these branded products. Similarly to most other cases, the manufacture of products with highly standardised levels of quality tends to reduce the diversity of the raw commodity. On principle, however, these products do have the potential to open up high quality niche markets for a wide range of traditional varieties. The most suitable suppliers in this instance would be the small highland farmers.

- ➔ **Completely new products** have also led to the development of niche markets. Multi-coloured potato crisps, for example, have been on sale at Lima Airport for around two years. The "Jalca Crisps" are produced by a processing and export company from a mixture of different potato varieties, which thanks to their natural colouring, including their skins, produce an assortment of red, blue and yellow crisps. Such a product may indeed help to secure the conservation of some unusual varieties since around 30 different varieties are used in the manufacture of this product. This can also secure the income of a few farmers and processors. In this particular instance, the supplying farmers of an Aymara village have a guaranteed buyer and 10% of the final sale price goes to a potato project with indigenous farmers.

### Challenges for the Future

All of these approaches offer the possibility of generating income and a few also offer traditional varieties access to quality markets. They should not, however, be over-valued and, in many cases, are still in their infancy. To give an example: in 2005, only a few hundred boxes of "Jalca Crisps" were sold per month for a price of 3 US\$ each, although the numbers being sold are increasing. The volume of trade with regard to the other above-mentioned new products also appears to be quite low. Apart from that, these marketing channels scarcely offer any openings for many bitter potato varieties.

In spite of the many successful project approaches, various studies have identified the following obstacles and challenges:

- ➔ (Certified) seed potatoes of adequate quality not available,
- ➔ Pesticides and fertilisers too expensive and without adequate guarantees of quality,
- ➔ Access to loans limited,
- ➔ Far-reaching communication via the mass media required,
- ➔ Insufficient cooperation between the actors,
- ➔ Difficult exchange of know-how, technologies and genetic resources between countries in view of intellectual property rights.

## 2.5 Suitability of Promoting Potato Production in Terms of Development Cooperation Objectives

The potato sector is one of the most important and dynamic branches of the agricultural sector in the Andes region. Support measures in this sector generally achieve improvements in the food, employment and earning situations for a large number of producing households.<sup>16</sup> Potatoes, especially the interesting, less prevalent

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<sup>16</sup> Valdivia (2003)

varieties, are predominantly cultivated labour-intensively, and to some extent processed, by poor small farmers in marginal areas.

It is estimated that in Bolivia around 50% of agricultural value creation goes to small family farms, although this figure is declining.<sup>17</sup> For these farms in the Andes, the potato is one of the most important crops. In Bolivia, over 30% of the family farms (240,000 of 700,000) cultivate potatoes and it is estimated that around 40,000 people live from the processing of and trade in potatoes in Bolivia.<sup>18</sup> It may be assumed that similar figures apply in Peru and the neighbouring countries.

Measures which contribute to the conservation of potato diversity often target poor households, for whom food security and income potential are improved. Better access for producers of traditional potato varieties to processors and end consumers through improved product quality can make a contribution to income creation and security. Compared with the potato market as a whole, however, the market for traditional potato varieties is small and will probably remain quite limited in future.

The farmers, for whom potato cultivation is essential to their survival, show great dedication in implementing measures. New or improved quality products could also provide additional business for trade and industry, whereby the interests of producers and processors are generally similar. At least there are hardly any conflicts of interest, as the usually poorly yielding land used for the production of the traditional varieties is of little interest for other uses while the production volume of the traditional varieties offers hardly any competition to the standard varieties on the market.

However, it is not always possible to achieve the goals of diversity conservation and access to markets at the same time because the quality and yields required by the food industry often lead to the cultivation of only a few varieties.

Improved brand products and completely new products can ensure that a few further varieties may be conserved via the marketplace. Up to now, however, this applies to fewer than one hundred varieties out of a total of two to three thousand.

Strengthening the market positioning of traditional products - in this instance *chuño* and *tunta* - can make a considerable contribution to the economically profitable use of a wide range of varieties and, in particular, non-standard varieties. As such, the potential of this example should be underlined.

It may thus be possible to conserve some potato varieties in the long term through a suitable value chain. This applies, however, only to a small proportion of the varieties available. As such, approaches via value chains must be enhanced with measures at different levels. Some examples are provided by the Parque de la Papa Project, which besides using the potato value chain has sought to improve earnings by means of other value chains, such as tourism. This has been possible given the specific conditions applying to the famous *Valle Sagrado* and cannot be simply transposed onto another location. It will therefore only be possible to lastingly conserve a significant number of potato varieties through the support of the gene banks and by means of subsidised cultivation.

To summarise, it is possible to conserve some of the potato varieties in the Andes through the value chain and thus also make a contribution to reducing poverty.

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<sup>17</sup> Valdivia, (2003)

<sup>18</sup> Valdivia (2003)

The full range of diversity cannot, however, be protected by market placement, rendering further measures necessary.

## 3 Conservation of Arabica Coffee Diversity in Ethiopia

### 3.1 Coffee in Context

Coffee was first cultivated in the 7th Century A.D. close to the Red Sea. Around 1000 A.D. it was already being cultivated in Islamic monasteries (ribats) in Yemen and commercial trade started in the 15th and 16th Centuries, for which extensive coffee plantations were created in the Yemeni regions of Arabia. In the 17th Century coffee consumption rose sharply in Europe which also had an effect on cultivation. The Dutch planted their first plantation in Java around 1690 and around 1714 a single coffee seedling was brought to the West Indies and successfully planted on the French island colony of Martinique. This seedling eventually gave birth to the great plantations of Latin America which, as a result, have a very narrow genetic range.

There are around 100 different coffee species but all commercially traded coffee comes almost exclusively from only two species, *Coffea arabica* and *C. canephora* (Robusta). Arabica grows in temperate climates in tropical highlands (>1,000 m) and supplies about 70% of world production. It has a finer aroma and better taste. Robusta is grown in the lowlands, gives higher yields and is generally a less demanding crop. Its taste, however, is not greatly appreciated, so it is used for blending and to increase the caffeine content in *espresso* and instant coffees.

Whilst Robusta grows in various regions of eastern and central Africa as well as in Brazil and Asia (Vietnam, Indonesia), *C. arabica* comes originally from two geographically secluded mountain regions of Ethiopia. Robusta has a double (diploid) set of chromosomes and is cross-fertilising. *C. arabica* on the other hand, unlike all other species of coffee, has four sets of chromosomes (tetraploid) and is self-pollinating. Investigations since the 1960s in Ethiopian plant nurseries by the FAO, ORSTOM and the National Coffee Collection Programme have identified more than 130 indigenous varieties of *C. arabica* and the Institute of Biodiversity Conservation and Research (IBCR) today has 4,000 varieties of coffee on its farm in Jimma.<sup>19</sup>

The numerous naturally occurring varieties which grow in the tropical mountain forests of western and south-western Ethiopia (Fig. 5) are endangered, as forest area has declined from 40% one hundred years ago, to only 3%.<sup>20</sup> It is predominantly gatherers and small producers in three different production systems who use and maintain diversity (see chapter 3.2). Outside these small farming production systems, the various species can only be conserved (*ex situ*) to a limited extent and with considerable effort in the nurseries of research and breeding installations, as the seeds in gene banks quickly lose their ability to germinate if they have been frozen or dried. For economic reasons and to allow continued natural selection under changing environmental conditions, the varieties should be conserved in their natural environments (*in situ*).<sup>21</sup>

In Ethiopia coffee is consumed in all households. It is chewed as a stimulant and forms part of the well-known Ethiopia coffee ceremony. Over half of the country's

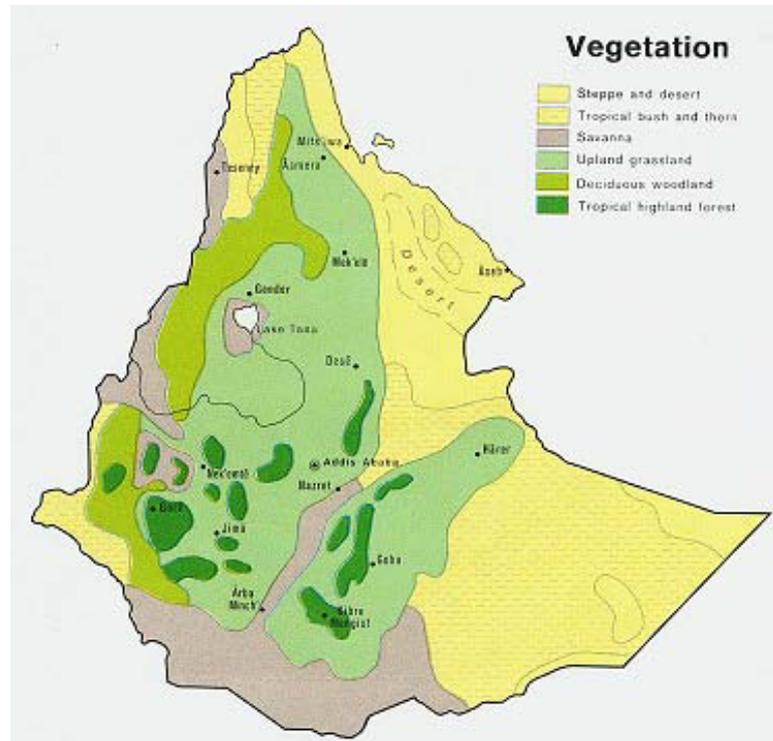
<sup>19</sup> Gole (2002), S. 239-240

<sup>20</sup> AO (2003) zitiert in Gatzweiler (2005), S. 213

<sup>21</sup> Gole et al. (2002), S. 237

production is thus used domestically. It is estimated that 15 million Ethiopian households are directly or indirectly dependent on coffee.<sup>22</sup>

**Fig. 5: Remaining Forests in Ethiopia**



With regard to world trade, the importance of coffee grew continuously over a long period of time. The main areas of cultivation and export are in Latin America, Africa and Asia, whilst consumption is largely in western countries. Around 40% of the world's population consume coffee on a regular basis.

Strongly fluctuating world market prices are influenced by climatically-conditioned variations in levels of production and quality and by speculation. The price of coffee drops after a good harvest and rises after a bad one. Before the Second World War it was therefore already deemed necessary to introduce quotas, which allocated a specific share in America's flourishing coffee market to each producing country. In 1962 an international coffee agreement was negotiated, whereby 41 exporting and 25 importing nations reached agreement on production and import quotas. The agreement fixed a price range and once the price had reached the upper price limit the quotas were eased. If the price fell too far, the quotas were reduced.

The agreement was renewed in 1968, 1976 and 1983 and finally lapsed in 1989, before it was possible to finalise the negotiations for a new agreement. For this reason, the 1983 agreement was extended until 1994, but without any prices and quotas being fixed. Nor was it possible to reach agreement in 1994 and 2001, so that finally only general promotional measures were agreed.<sup>23</sup> After 1989, therefore, the price of coffee was determined exclusively by supply and demand, whereby prices rose

<sup>22</sup> Oxfam (2002), P. 2. Kotecha, (undated, P. 5) quotes domestic consumption in Ethiopia as 35-45% of production.

<sup>23</sup> <http://www.ico.org/history.asp#ica4>

to their highest level in a hundred years and then hit rock bottom in 2001.<sup>24</sup> An estimated 25 million producers and their dependants were and still are, directly affected by the price collapse.<sup>25</sup>

The main reason for the price collapse was and remains, poor structural development, which led to a glut on the market. Overall, production rose by about one-quarter from 6.1 million tons in 1990 to 7.7 million tons in 2005 (Table 1). Central and South America and Africa, who were still the main producers at the beginning of the 1990s, were forced to give up part of their share in the world coffee trade to Asia. Today the world's biggest producers are Brazil, Vietnam, Colombia and Indonesia. In Africa, Ethiopia takes prime position.

In Ethiopia, as in other African countries (Burundi, Rwanda and Uganda), coffee makes up over 60% of export revenue and represents 80% of all jobs.<sup>26</sup> As such, a price collapse has direct economic consequences. According to reports by the Ethiopian National Bank the decline in coffee prices has caused a further major diminution of foreign exchange reserves. Coffee exports went down by around 10% from 103,423 tons in 1991 to 94,000 tons in 2001. In the period from 1999/2000 to 2000/2001 alone, however, the value of these exports shrank from 262 to 175 million US\$,<sup>27</sup> a loss of one-third. Money from donors was able to alleviate some of the effects on state, society and the economy which would normally be caused by such a drastic loss of income.

**Table 1: World Production of Coffee and the Main Producing Countries by Region<sup>28</sup>**

<i>Region/ Country</i>		<i>Annual Production [1000 t]</i>					
		<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
<b>World</b>		<b>6,072</b>	<b>5,537</b>	<b>7,553</b>	<b>7,184</b>	<b>7,787</b>	<b>7,719</b>
<b>Africa [%]</b>		<b>21</b>	<b>20</b>	<b>16</b>	<b>12</b>	<b>13</b>	<b>13</b>
<b>South &amp; Cent. America [%]</b>		<b>62</b>	<b>56</b>	<b>55</b>	<b>57</b>	<b>58</b>	<b>55</b>
<b>Others [%]</b>		<b>17</b>	<b>23</b>	<b>29</b>	<b>31</b>	<b>29</b>	<b>32</b>
Africa	Ethiopia	204	230	230	222	260	260
	Uganda	129	182	144	151	186	186
	Côte d'Ivoire	286	195	336	140	160	160
C/S. Amer.	Brazil	1.465	930	1.904	1.987	2.467	2.179
	Colombia	845	822	637	694	681	683
	Mexico	440	325	338	311	312	311
Oth-ers	Vietnam	92	218	803	794	835	990
	Indonesia	413	458	625	686	700	762
	India	118	180	292	275	275	275

A further important reason for the decline in price was the increasing consolidation of companies on the buyer side. Today, a small number of international

<sup>24</sup> Taylor (2004), P. 132

<sup>25</sup> <http://www.ico.org/mission.asp>

<sup>26</sup> Kotecha (undated), P. 4

<sup>27</sup> Oxfam (2002), P. 3

<sup>28</sup> Source FAOSTAT <http://faostat.fao.org/faostat/>

roasters and traders is ranged against a very large number of small suppliers who are either not organised at all or are only partially organised and therefore have little negotiating power.

### 3.2 Functions and Actors in the Coffee Value Chain<sup>29</sup>

The coffee value chain may be subdivided into specific inputs, the production of coffee cherries, their primary processing, marketing, a further processing step and, lastly, consumer marketing (Fig. 6).

#### Coffee Production

Coffee production in Ethiopia is practiced using four different systems of cultivation with varying degrees of farming intensity.<sup>30</sup> The so-called "forest" coffee is picked from wild coffee shrubs which still exist in the tropical mountain forests in the west and south-west of the country. There are hardly any maintenance measures with this system so that the coffee meets ecological requirements; yields are, however, low. Forest coffee makes up only 5-6% of Ethiopia's coffee production. With the so-called "semi-forest" system wild shrubs are also used but these are cared for by the pickers. Superfluous shadow-giving trees are felled and/or new shadow-giving trees are planted in places where they are thin on the ground. The undergrowth is cleared to give the coffee shrubs a better chance of growing. Wild or cultivated seedlings are planted in between to increase shrub density. The semi-forest system provides about 20% of national coffee production. With the "garden" system, coffee shrubs are cultivated by subsistence farmers in small plantations. These receive intensive care although, generally speaking, there are no external inputs. The majority of Ethiopia's coffee comes from these small plantations, which make up about 160,000 hectares or 40% of the country's entire coffee-growing area.<sup>31</sup> These three systems contain and conserve the bulk of genetic diversity in Ethiopian coffee, which has made possible the breeding of CBD-resistant and locale-adapted strains. There are also about a further 20.000 hectares of coffee plantation, either with or without shadow-giving trees.

The coffee seedlings are cultivated from seed or cuttings and, after being planted, are kept free of weeds for three to four years, before they begin to bear. During this time, particularly under the garden system, other plants will be bedded in between the young shrubs. In well-tended plantations the shrubs will be pruned annually to remove superfluous shoots. In normal soil, the coffee plant gives its best yields during the first 20 years of its life. In the following 20 years, the quality of the cherries and the yield gradually decline. Depending on the climate Arabica reaches maturity at between 6-8 months, whilst Robusta does so at 9-11 months.

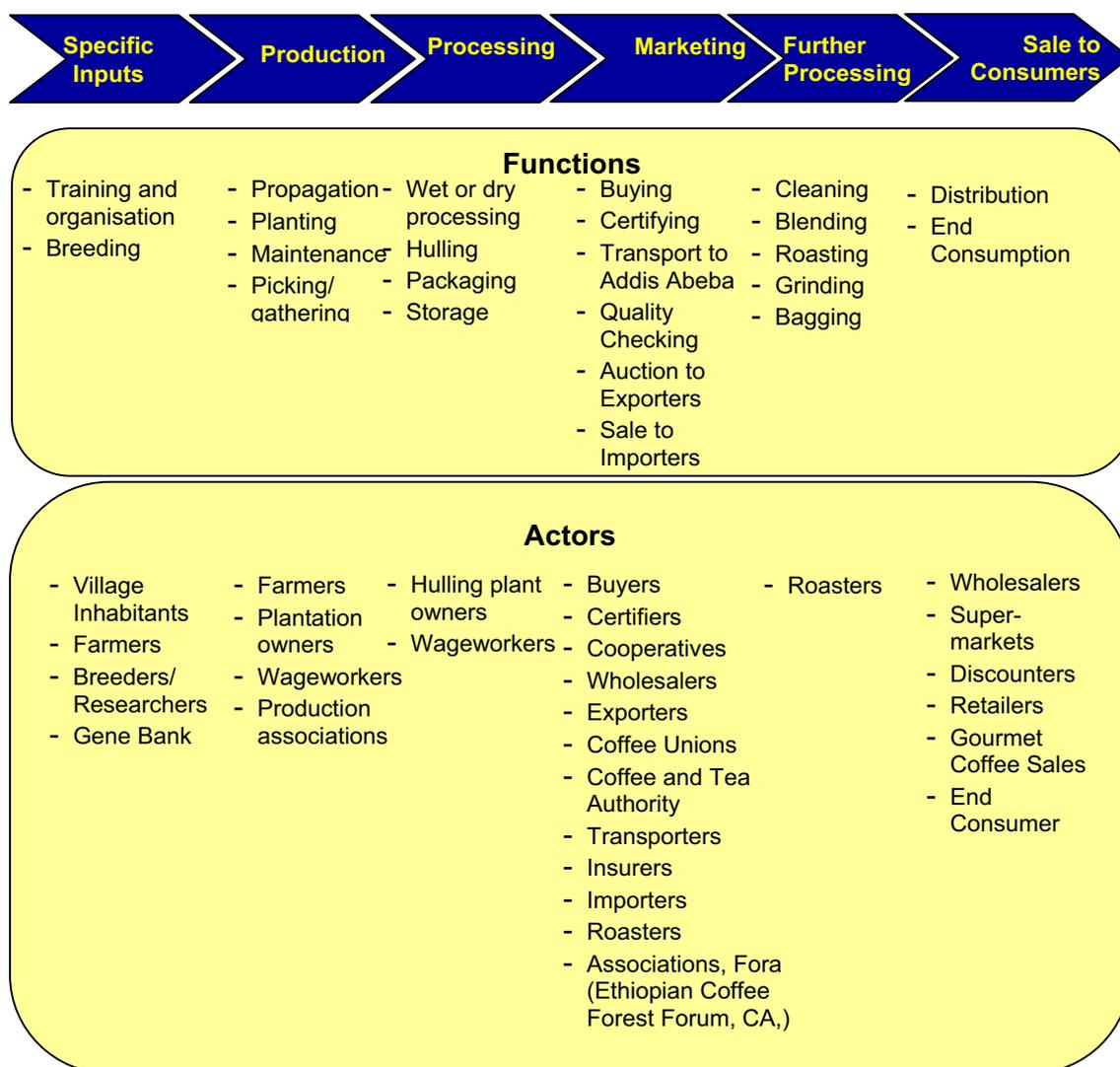
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<sup>29</sup> Information on cultivation and processing are available at <http://th04acc0102.swisswebaward.ch/de/html/6000.html>

<sup>30</sup> Gole (2002), P. 239

<sup>31</sup> Kotecha (undated), P. 2

**Fig. 6: Value Chain: Coffee in Ethiopia**



Unwashed coffee is harvested in Ethiopia from October to March. The washed coffee, which requires ripe berries, is harvested between August and December. Medium-sized yields from small farmers are around 500-600 kg per hectare, and are harvested by the entire family. In favourable locations neither mineral fertilisers nor pesticides are used, whereby the coffee meets the criteria for ecologically-sound coffee, although only a small part of this "green" coffee is actually certified as such. The bulk of this coffee goes to the conventional coffee trade.

### First Processing in the Country of Origin

During preparation, the coffee beans are removed from the outer casing. Pulp, peel and parchment-like skin are removed to get at the green coffee bean. Wet and dry processing form the basis for two different qualities of coffee. Whereas Robusta coffee is only dry-processed, Arabica undergoes both processes. Wet-processed Arabica coffees are known as "Milds". In world coffee trade terms, there are two groups of "Milds": "Colombian Milds" and "Other Milds". Dry-processed Arabica is described as "Natural". Within the coffee trade, this Arabica is designated as a "Brazilian Natural".

80-90% of Ethiopia's coffee is dry-processed. For this, the cherries are picked or gathered from the ground and spread out in thin layers to dry in the sun. Since the degree of ripeness can be variable in dry-processing, the trees can be harvested in one go. Dry-processing is simple and cheap but requires adequate dry periods and space for drying.

Wet-processing was developed for damp regions. Only fully ripe cherries, which are harvested at 8-10 day intervals, may be used. The cherries are squeezed into a pulper whereby most of the pulp separates from the parchment-like skin. The beans, with the rest of the slimy pulp are then fermented for 1-2 days. The remaining fruit pulp liquefies and can be washed away. After washing, the coffee is dried in the sun or in driers with a humidity of 11%. The leftovers from the processing are used as mulch or, after composting, as fertiliser.

Wet-processing is carried out in cooperative washing stations, by private traders or in warehouses. After drying, the product is known as "parchment coffee".

## Marketing

In Ethiopia coffee marketing is between producers who sell to their cooperatives or to private traders. All traders involved are licenced by the State to undertake certain functions. As such, the buyers (*Sebsabies*) may only buy directly from the farmers and may only sell on the coffee to the wholesalers (*Akrabies*). *Akrabies* for their part, may only buy from the *Sebsabies* and then deliver the coffee for auction. They may not, however, export directly. Export is the privilege of a few special exporters with the corresponding licence.

The cooperatives have become less relevant since the coffee crisis, as some of them are bankrupt and others do not possess sufficient capital to buy up larger quantities of coffee. After the breakdown of the coffee agreement they initially played an important role in fixing a minimum price. The private traders had to offer more than this price in order to buy the coffee. Today, since the cooperatives can no longer guarantee that they will buy up the harvest, private traders are in a position to demand lower prices.

Where possible, the farmers in Ethiopia prefer to sell the cherries for wet-processing as higher prices may be obtained. The sale of "fresh" cherries is, however, only possible during a short period during the harvest, when prices are low across the board. Dry cherries on the other hand may be sold all year round. Many farmers are, however, forced to sell their coffee directly after harvest, to get cash. Financial pressure and a lack of information on market prices often allow the buyers to get the produce at low prices. Almost half of the small farmer's annual cash income comes from the sale of coffee and work directly related to it.<sup>32</sup>

The buyers in turn sell the coffee to the wholesalers, who bring the coffee to Addis Abeba, where the beans are examined by the state-run Coffee and Tea Authority and quality-approved. Samples of those coffees which are suitable for export are sent to the auction house, where they are tested and bid for by the exporters. Lower quality coffee goes to the domestic market.

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<sup>32</sup> Patty *et al.* (undated), P. 18

Exporters themselves do not act as buyers and must be Ethiopian. Foreigners may neither bid at auction nor act directly as exporters. The exporters clean, sort and blend the coffee and prepare it for export. The coffee must be submitted again to the Coffee and Tea Authority which releases it for export after a final examination. For this, the coffee is packed in labelled standard 60 kg sacks.

The exporters sell the coffee to international importers, who then sell the coffee on to the roasters in the destination countries. The 10 biggest importers of Ethiopian coffee are Volcafe, Weser International, Al Kahair General, Mitsui, Nichimen, Mitsubishi, Toyota Tususho Corporation, Taloca, Toshoku and Neumann. Ethiopian coffee goes predominantly to Japan (21%), Germany (20%), Saudi Arabia (14%), USA (8%) and France (6%)<sup>33</sup>.

Since 1999 four cooperative umbrella associations have been set up as an alternative to traders, buyers and exporters. One of these is the Oromiya Cooperative Union with its own export licence and a total of 23,000 members. It buys the coffee from its members and takes over the transport to Addis Abeba as well as the hulling, cleaning and sorting. The Union's coffee must also be inspected and passed by the Coffee and Tea Authority but the Union may negotiate directly with the importers and does not have to sell the produce at auction. The Union numbers Fair Trade amongst its buyers. Apart from the Unions, there are a few special producers who also have a licence to directly supply foreign importers.

### Further Processing

The coffee is roasted in the consumer country. Blends from different types of coffee are normally used, although occasionally a single variety may be roasted.

Roasting takes place at temperatures between 160-250°C and gives rise to the actual coffee aroma, the preservation of which, even with good packaging, is very limited. During roasting, the coffee loses about 20% of its weight but at the same time increases its volume by about 25%. After roasting the beans are cooled in a sieve to prevent further changes. The roasted beans are then sorted again by quality.

New technical processes have a bearing on possible coffee blends. Whilst previously Robusta could only be added in small quantities to mild coffee blends, the steam cleaning process gives Robusta a smoother flavour thus allowing a greater quantity to be added to the blend.

Coffee extract is produced in both the consuming and, to some extent, the producing countries. Roasted, ground coffee is extracted using hot water. The granulated coffee is created through spray drying or, in the case of better quality coffee, by freeze drying. In spray drying the coffee extract is fed into a spray tower of up to 30m in height and blown up the tower with high pressure. Counter-currents of hot air evaporate the coffee's water content. In freeze drying the viscous coffee slush is placed on a steel belt, where the liquid is extracted. The frozen coffee is then broken up into the desired granule size.

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<sup>33</sup> Oxfam (2002), P. 7

## End Sale

After further processing the roasters pass on the coffee to the wholesalers and retailers who sell it to the end consumers. In today's coffee market the big roasters have a powerful position alongside the importers. Kraft Foods, Nestlé, Proctor & Gamble, Sara Lee and Tchibo buy up about half of the world's coffee.

Alongside the big international companies, smaller roasters also have an appreciable market share. They offer "Specialty Coffees" with which they have opened up their own circle of clients. They often maintain direct relationships with the producers, for whom they open up niche markets, e.g. certified Fair Trade or "green" coffee. Nevertheless, the bulk of Ethiopian forest and semi-forest coffee which fulfils the criteria for "green" coffee is marketed as conventional coffee, without receiving any premium for special quality.<sup>34</sup>

There are clear distinctions in the roasted coffees on the market. Coffee's biological diversity and the types of processing available, allow the creation of flavours, whose range can be compared with those of wine.<sup>35</sup> The various quality criteria may be physical properties, flavour, environmental criteria (shadow, forest or wild coffee) or social characteristics. Generally speaking there are clear differences in price between cheap offers and premium coffees, whereby profits are higher in the more expensive segment of the market than in the cheaper. This price differentiation, however, has tended to create more profit in the consumer countries than for the producers (Fig. 7).<sup>36</sup>

The proportion of the end sale price which remains in the producing countries has declined. At the beginning of the 1990s the producing countries received on average one-third of the coffee's end value; in 2002 this value had gone down to about 10%. In comparison, the profit margins of Nestlé and Sara Lee are estimated at 26% and 16% respectively, in other words quite high when compared with the marketing of other foodstuffs and luxury items.<sup>37</sup> The nominal coffee price for the four main coffee types traded rose from 0.50 US\$ per pound in the mid 1960s to about 60 US\$ per pound in 2001. When measured against purchasing power, however, the real price dropped by about 50%.<sup>38</sup> Today's price barely covers production costs.

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<sup>34</sup> Gatzweiler (2005), P. 214

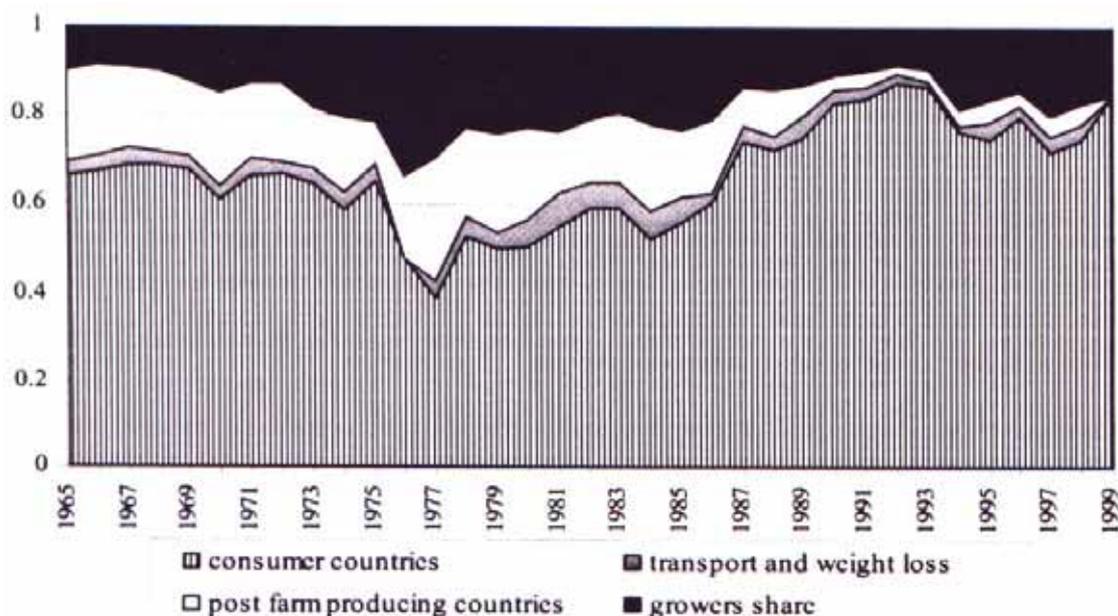
<sup>35</sup> Fitter & Kaplinsky (2001), P. 4

<sup>36</sup> Fitter & Kaplinsky (2001), P. 14

<sup>37</sup> Oxfam (2002), P. 2

<sup>38</sup> Fitter & Kaplinsky (2001), P. 8

Fig. 7: Distribution of the Coffee Price amongst the Actors in the Value Chain



### 3.3 Support Measures and Findings in the Area of Coffee Production in Ethiopia

Various donors have undertaken support measures at various points of the coffee value chain in Ethiopia's coffee sector. At production level there have been efforts to conserve the naturally occurring species and varieties *in situ*. Through the training of the farmers, an attempt was made to improve the quality of the coffee produced and create better marketing conditions through certification. The various producers' organisations (cooperatives, umbrella associations) were strengthened and the marketing infrastructure was improved. As around 90% of Ethiopia's coffee is produced by small farmers in forest, semi-forest and garden systems, who also look after diversity, support measures on behalf of the farmers also help indirectly to conserve coffee's diversity.

The World Bank's first two Coffee Projects (1972-80 and 1983-92) focused on improving processing and marketing. The Swiss cooperation promoted activities which increased yields and raised the quality of washed coffee through the improvement of existing washing stations and the construction of new ones.

Since 1977 the EU has been conducting the Coffee Improvement Project (CIP) in Ethiopia. Its focus was, and still is, the improvement of coffee production. The EU's involvement began at a time when the coffee berry disease (CBD) was endangering production. Initially, therefore, nurseries for propagating CBD-resistant strains were given support, access roads were built to facilitate marketing and loans were granted for the construction of washing stations.

The current Coffee Improvement Programme IV (CIP IV) sponsored by the European Commission is taking action in the following areas:

- improvement in the way technical advice is provided to farmers.

- Promotion of 80 coffee tree nurseries, in order to produce locale-adapted, healthy seedlings.
- The direct conservation of existing wild varieties serves to protect the coffee forests: protected areas were established in three zones in the south-west (Geba-Dogi - 18,600 hectares, Boginda-Yeba - 5,500 hectares and Kontir-Berhan - 20,000 hectares), to protect the existing genetic diversity of forest coffee.<sup>39</sup> Only local farmers have access to these forests and limited usufructuary rights. They may, for example, gather firewood there.
- Promotion of coffee research: here the aim is first and foremost to develop indigenous varieties further and to breed CBD-resistant varieties.
- Marketing promotion through improving the collation of statistics on coffee prices and quantities sold, the improvement of the analytical laboratory and support in helping to sell on the international markets.

Further support for the Ethiopian coffee sector takes the form of marketing through the Fair Trade Initiative. Fair Trade is a member of the umbrella organisation Fair Trade Labelling Organisation International (FLO)<sup>40</sup>, which cooperates worldwide with 420 producer associations with a total of 800,000 members.<sup>41</sup> In 2004 FLO worked in Ethiopia with three producer associations.<sup>42</sup>

Producers who wish to obtain Fair Trade certification must be organised into associations, whose membership is largely made up of small farms. These associations must be democratic and politically independent, must commit themselves to sustained development, ecology, education and the promotion of women and decide democratically on the division of profit.<sup>43</sup> Coffee was the first Fair Trade product and has up to now had the highest sales. In spite of strong growth rates, the absolute quantities marketed have been small (Table 2). In 2001 about 1% of coffee was sold via Fair Trade.<sup>44</sup>

A further certification system with social, ecological and economic goals is offered by the Utz Kapeh Foundation<sup>45</sup> initiated by the Dutch retailer, Ahold. The Utz Kapeh certification criteria are based on, and recognised by, EUREPGAP, whereby further criteria of the International Labour Organisation (ILO) have been added as well.

**Table 2: Fair Trade Coffee Turnover 1998 – 2003<sup>46</sup>**

Year	Tons	Increase
1998	11,664	
1999	11,819	1.3%
2000	12,818	8.5%
2001	14,388	12.3%
2002	15,780	9.7%
2003	19,872	25.9%

<sup>39</sup> Gatzweiler (2005), S. 216

<sup>40</sup> <http://www.transfair.org>

<sup>41</sup> <http://www.fairtrade.net/sites/certification/explanation.html>

<sup>42</sup> <http://www.fairtrade.net/sites/products/coffee/partners.html>

<sup>43</sup> Robinson (2000), S. 12

<sup>44</sup> Fitter & Kapinsky (2001), S. 12

<sup>45</sup> <http://www.utzkapeh.org/index.php?pageID=101>

<sup>46</sup> <http://www.fairtrade.net/sites/products/coffee/sales.html>

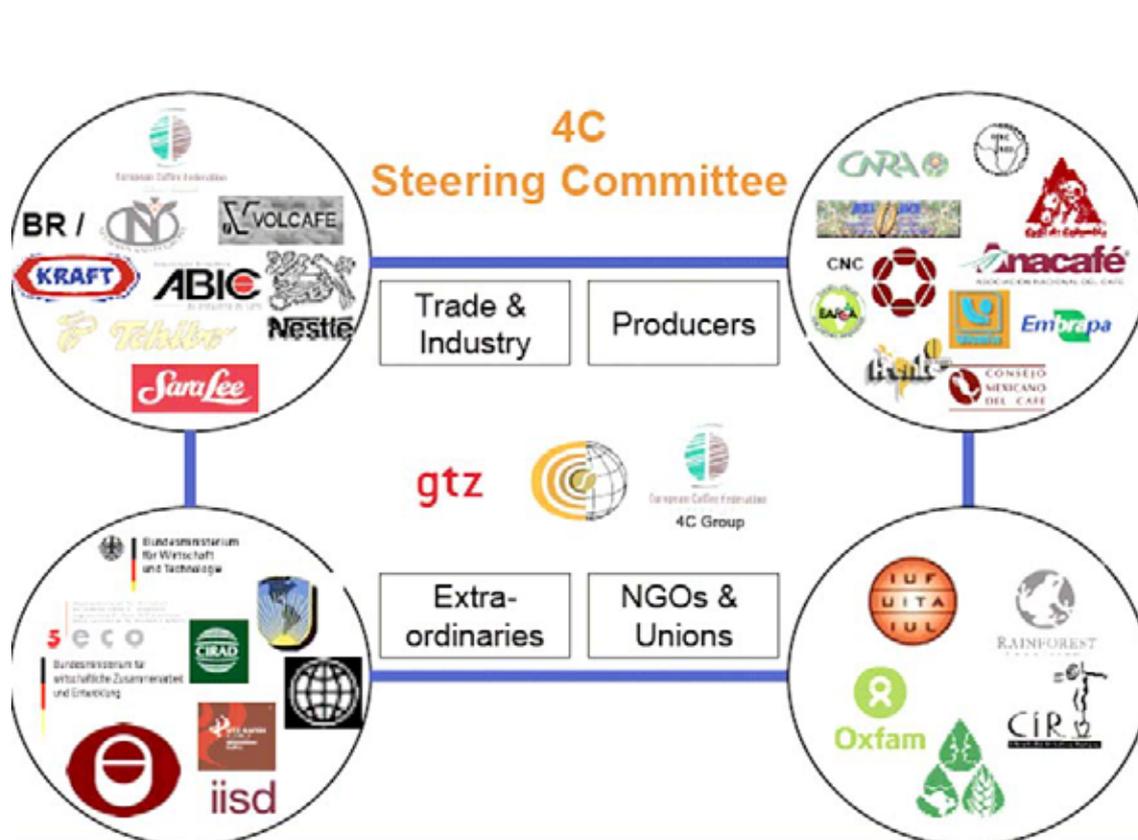
In contrast to Fair Trade and Utz Kapeh whose aims tend to be the improvement of the economic and social position of the producers, the activities of the Rainforest Alliance are focused more on the conservation of eco-systems and biological diversity. In cooperation with an Ethiopian coffee exporter (ASK International Trading), a buyer with a washing station and the Belgian coffee importer, EFICO, a group of 678 coffee producers were able to obtain Rainforest Alliance certification.<sup>47</sup> The members committed themselves to conserve biodiversity, manage their natural resources and apply fair working conditions, using a verifiable set of recognised standards. The group's certified coffee is bought up by the Belgian importer EFICO, whose company-owned foundation supports the farmers in achieving the certification standards. There is increasing demand for coffee with Rainforest Alliance certification and higher prices can thus be achieved for the producers.

The Rainforest Alliance and Utz Kapeh initiatives are of major importance as they are trying to create better conditions for the producers within the mainstream coffee market, whereby they themselves obtain marketing advantages for their products through the acceptance of ecological, social and economic standards and, at the same time, ensure for themselves a lasting supply of coffee. Unlike Fair Trade, which guarantees a minimum price and needs the acceptance of the end consumer to achieve higher prices, these new concepts potentially allow a large number of producers access to improved production conditions, and can thus make a great contribution to the conservation of genetic diversity.

Since 2003, improved market access and trading conditions and the use of sustainably effective production techniques have been the goals of the Common Code for the Coffee Community (4C) initiative, which is supported by the European Coffee Federation, the Swiss State Secretariat for Economic Affairs (SECO) and the GTZ. 4C is trying, with all relevant actors in the sector, to create a concept which will ensure fair conditions for all parties involved in the mainstream sector.

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<sup>47</sup> [http://www.rainforest-alliance.org/news.cfm?id=ethiopian\\_farmers](http://www.rainforest-alliance.org/news.cfm?id=ethiopian_farmers)



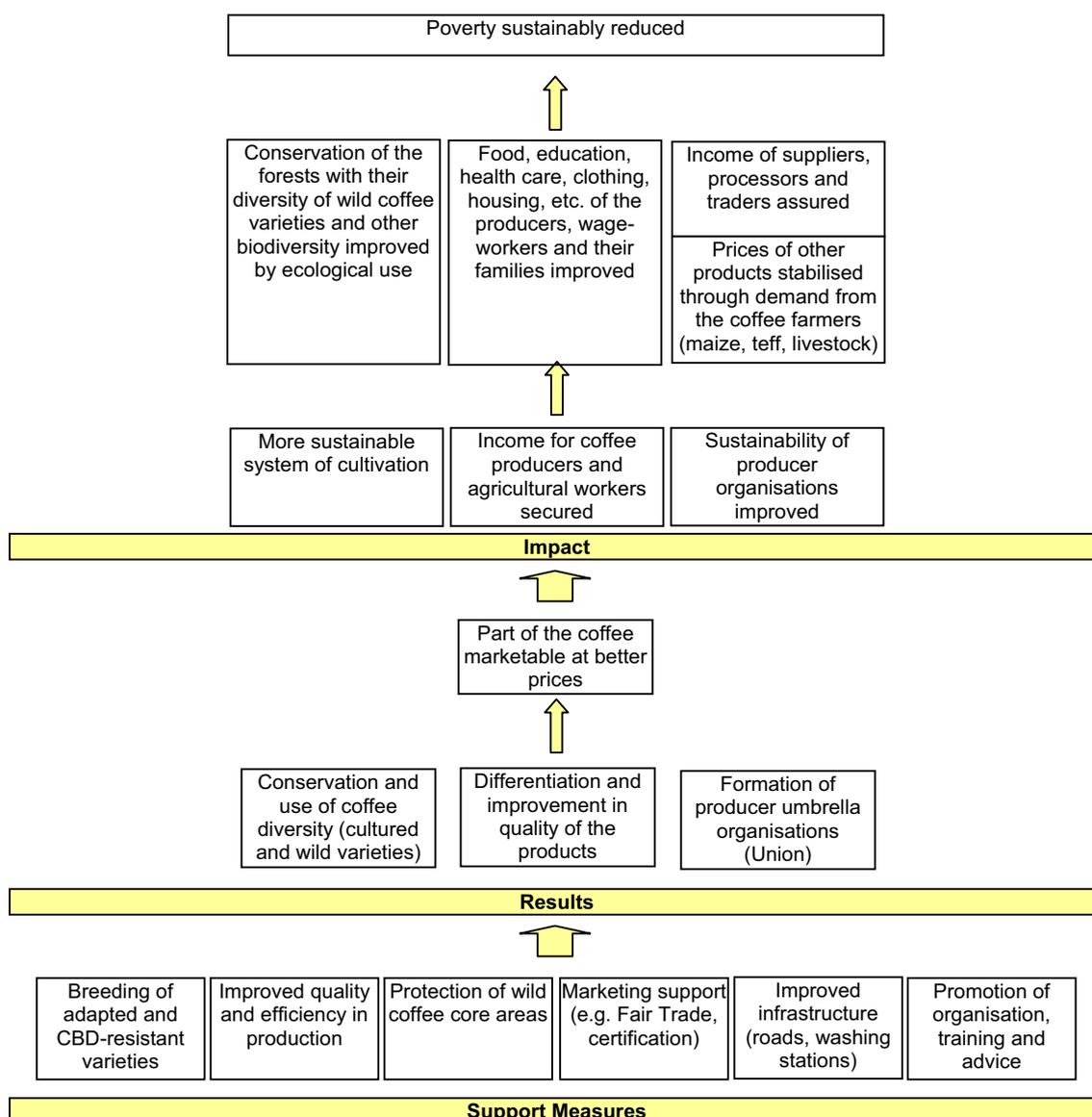
The steering committee (see above)<sup>48</sup> comprises representatives of the producers, traders, processors, trade unions and environmental organisations. Measures aim at increasing efficiency in production and trade and improving quality, whilst taking the principles of ecological, social and economic sustainability into consideration. East Africa is represented on the steering committee by the East African Fine Coffees Association (EAFCA). The initiative's potential lines in the involvement of a large section of the buyers, who buy 65% of all coffee.

### 3.4 Results and Impact of Support Measures in Coffee Production

The bulk of coffee production comes from small farmers. For these farmers, coffee often represents the main source of income whilst basic food requirements are covered by other crops. Cash earned through coffee is used to buy clothing, as school money for the children, for health care and for the purchase of important household equipment and extra food. When the income from coffee declines, expenditure in these areas goes down accordingly. In the event of an extreme loss of income, reserves, usually in the form of livestock, are used up.

<sup>48</sup> <http://www.sustainable-coffee.net/download/2005/steering-committee.pdf>

**Fig. 8: Impact Pathway: Coffee in Ethiopia**



One notable success in existing development cooperation measures was, initially, the early introduction of around 50 pulping and washing stations by the World Bank and the EU in the 1970s and 1980s, primarily in the southern coffee cultivation areas. Thanks to improved processing, the coffee price almost doubled both for the farmers and the country. Further private washing stations (around 100) were built at the end of the 1990s. Following the high price phase in 1999, the construction of washing stations boomed. A further 450 were built, which led to destructive competition amongst the stations and to unchecked water pollution.

Continuous improvements in breeding allowed the development of CBD-resistant varieties, so that it has been possible to contain this disease since the dangerous epidemic in 1973. Since then, various indigenous varieties have been developed to suit different conditions of cultivation; breeding work carried out by the Ethiopian institutions continues to be supported by an EU programme.

Up to now there has been hardly any progress in achieving lasting infrastructural improvements (roads, telecommunications) or in advising farmers. 50% of the producers live more than 35 km away from the nearest all-weather road, so that they cannot be reached all year round. Only 60% of the farmers are now literate, so that further education and the exploitation of their full potential is limited.<sup>49</sup>

The direct protection of biodiversity centres for coffee through the establishment of protected zones is important for the conservation of the last wild stocks, but has proved to be of limited effect, as monitoring is inadequate.<sup>50</sup>

Promoting the organisation of the producers into producers' associations, cooperatives and unions has benefited the producers. On the one hand such organisations facilitate the various certifications and cooperation with external initiatives (Rainforest Alliance, Utz Kapeh), while on the other hand, the Unions were able to achieve higher prices than the exporters when selling to commercial importers (Table 3). As elements of intermediate trading are removed from the union model, the cooperatives obtain considerably higher prices than when dealing with private buyers and can thus distribute profits to their members.

**Table 3: Sale Prices along the Value Chain<sup>51</sup>**

Price Level / Product	Sale Price achieved in commercial trade (Birr/kg)	Sale Price achieved when selling through Union (Birr/kg)
	Farmer	Farmer
Dry coffee	1 – 1.5	1 – 1.5
Wet coffee	0.5 – 0.75	0.5 – 0.75
	Buyer/ Cooperative	Cooperative
Dry coffee	1.25 – 1.75	4 – 6
Wet coffee	0.75 – 1	8 – 11
	Wholesaler	Coffee Union
Dry coffee	4 – 8	8 – 10 (commercial trader)
Wet coffee	8 – 11	23 – 26 (Fair Trade) 15 – 20 (commercial trader)
	Exporter	
Dry coffee	7 – 9	
Wet coffee	11 – 16	

The Fair Trade initiative already affords the farmers a substantial increase in earnings. They receive long-term supply agreements, a minimum price of 1.26 US\$ per pound<sup>52</sup> plus an additional 0.15 US\$ in the case of organic coffee. When the world market price surpasses the Fair Trade minimum price, the farmers receive at least 0.05 US\$ more than the world market price. The certification and monitoring of Fair Trade standards is carried out by FLO-Cert Ltd. Fair Trade prices give the farmers extra income and allow them to plan, especially during years when prices are low (Fig. 9). Nevertheless, Fair

<sup>49</sup> Personal information

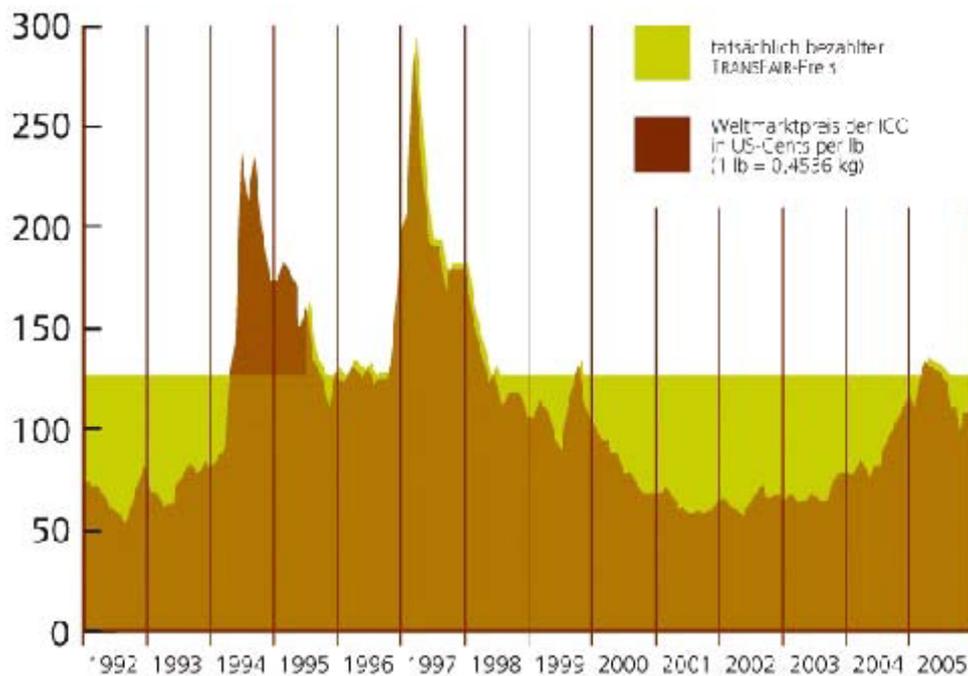
<sup>50</sup> Gatzweiler (2005), P. 216

<sup>51</sup> 2001 data from Oxfam (2002), P. 8

<sup>52</sup> British Pound = 0.4536 kg

Trade offers a solution for only a few producers as consumer markets are small and are outside the mainstream coffee market. The Fair Trade initiative has been successful to date in that it managed to create a relationship between consumer and producer and to convince consumers that by paying a voluntary surcharge, they are making a real contribution to improving the living conditions of the producers. For this, the consumers are prepared to bear the costs of certification and are willing to pay a social premium.

**Fig. 9: Development of Fair Trade and World Market Prices for Coffee 1992 - 2005**<sup>53</sup>



New approaches such as the 4C initiative, which seek to balance the interests of producers, traders and consumers within the mainstream industry, are more promising. If successful, such approaches will bring about an improvement in production conditions and thus in the living conditions of a great number of producers. As such they are also an incentive to many small producers to continue cultivating the various wild and cultured varieties and contribute to the conservation of genetic diversity.

Efforts to improve the traceability of coffee can also help to achieve higher prices for unique quality types (e.g. forest coffee).

In order to achieve benefits for the majority of coffee producers, however, there must first be improvements in the mainstream market. In the Fair Trade sector too, efforts are being made to move out of a niche market position and open up new markets for the producers. Fair Trade products are increasingly available in the large supermarket chains (Metro, Rewe, Edeka, Spar). One of their most recent successes

<sup>53</sup> <http://www.transfair.org/produkte/kaffee/Wissenswertes>

was being taken up by Starbucks, which is now the USA's biggest buyer of Fair Trade coffee.

In spite of some success stories, certification approaches are still difficult to understand for many farmers and the Ethiopian government views them, to some extent, with scepticism. Ethiopia offers very good opportunities for further improving the quality and production of its premium coffee. First, however, it is necessary for companies, who have already made reasonable concessions, to continue ensuring the traceability of the coffee and to use this in their marketing. Only a small proportion of certified coffee is sold as such. It remains to be seen to what extent improvements in quality will lead to sustained higher prices for Ethiopian coffee, given that the quality standard will also rise worldwide and it will become more difficult to differentiate between premium coffee and the lower-grade product.<sup>54</sup>

### **3.5 Suitability of Promoting Coffee in Terms of Development Cooperation Objectives**

The shape of the coffee value chain is determined by demand, with the exception of a few niche markets.<sup>55</sup> One explanation for this is that production is split amongst several countries in competition with each other, who have developed few alternatives to coffee production. In the countries themselves, the producers are fragmented into a multitude of small farmers who are poorly organised and have no common representative of their interests. 70% of the world's coffee is produced by farms with an area of under 5 hectares. Equally in Ethiopia, it is small farms which produce the vast majority of the coffee and which, at the same time, cultivate and conserve the genetic diversity of the Arabica coffee.

The now-defunct National Marketing Boards, which were necessary to monitor the rules of the Coffee Agreement, were dissolved in the wake of structural adjustment programmes and a general trend away from state intervention. In 1985, for example, only 15 of the 51 main producing countries had a coffee market which was controlled by private companies.<sup>56</sup> All the others had more or less state-controlled Coffee Boards, Coffee Institutes or stability funds which regulated the market. With the abolition of these regulatory bodies, many countries lost the ability to control exports and build up reserves.<sup>57</sup>

On the demand side, on the other hand, there are only a few big trading companies and roasters, leading to a very uneven distribution of power. However, these buyers are also vitally interested in the conservation and improvement of the quality of Ethiopia's coffee and are prepared to make concessions which will help to protect the biological diversity of Ethiopian coffee.

In evaluating support measures in the coffee value chain, one must differentiate between the specific situation in Ethiopia and the situation in other coffee-producing countries. In Ethiopia, as the genetic home of Arabica coffee, the conservation of natural coffee diversity is a specific goal of support measures, which is not the case in other countries. Also measures to promote the sale of Ethiopian coffee make at least an indirect contribution to conserving diversity, as the small farmers in Ethiopia both

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<sup>54</sup> Personal information

<sup>55</sup> Fitter & Kaplinsky (2001), P. 14

<sup>56</sup> Ponte (2001), P. 22

<sup>57</sup> Ponte (2001), P. 15

produce the bulk of the coffee in the country and conserve the diversity in their coffee gardens.

This particular situation justifies measures which ensure that Ethiopian coffee retains a specific market share of worldwide consumption in the long term. All measures which increase efficiency of production and competitiveness or which open up privileged niche markets which acknowledge its special role, quality and variety, are suitable. The most appropriate areas for support are quality improvement measures, classification of different qualities, certification and the organisation of the producers.

Outside the specific context of Ethiopia and against the backdrop of a market which periodically suffers from surplus production, those measures which stabilise production with sustainable cultivation methods and which help to improve efficiency and quality, are most suited to facilitate the marketing conditions and thus the living conditions of the producers. Marked increases in production may lead to a further drop in prices. While they may have positive effects for single groups of producers, these will be at the expense of other producers, domestic and foreign.

Measures to increase consumer awareness and to develop organic brand names in order to promote the market share of Fair Trade, organic and premium coffees are promising. However, even where these niche markets are expanded, the overall volume of coffee sold remains limited.

It would seem that long-term improvements for the producers are more likely to be achieved through measures on the side of the buyers and at political level. Increased awareness and negotiations between all parties in the value chain, together with consumer pressure, may promote voluntary undertakings, which will improve the production conditions for the producers. There appears to be little political interest at present in a new coffee market agreement which would regulate the fair distribution of profits between producers and buyers.

Apart from the above, measures to promote diversification for coffee farmers, in order to reduce their one-sided reliance on the world market, are of prime importance.

## 4 Argan Oil Production in Morocco

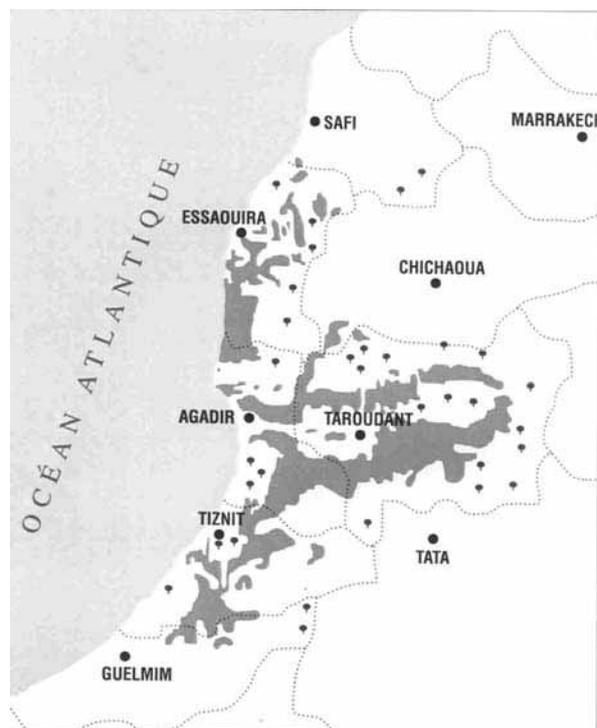
### 4.1 Argan Oil in Context

Argan oil is obtained from the fruit of the argan tree (*Argania spinosa*), also known as the Morocco ironwood. This tree belongs to the family of *Sapotacea* (soapwoods), and it can be traced back over more than two million years to the Tertiary Period. A typical tree has a broad, usually twisted, trunk of up to 10m in length, with a huge bushy crown, reaching up to 14m in diameter. Its unique, very deep and wide-reaching root system allow it to make excellent use of the water in the soil, but also because of its powerful root penetration and formation of pores, it can channel extremely heavy rains below ground, thus raising the groundwater level. The fruit ripens year-round and in good years, a tree may bear up to three generations of blossoms and fruit at completely different stages of maturity at the same time. The argan tree can tolerate drought and temperatures of over 50°C by going dormant. When the first rains fall, it then once again puts out leaves and flowers.

The argan tree has various uses. The very hard, dense wood serves as firewood, for charcoal production and for building. The leaves and youngest shoots are eaten by livestock. The fruit comprises the fruit pulp and an extremely hard nut with two to three kernels, from which a premium oil is pressed. This oil contains over 80% unsaturated fatty acids, Vitamin A, considerable quantities of tocopherol (Vitamin E - antioxidants) and a remarkable quantity of sterols (schottenol and spinasterol). The oil is used as a human foodstuff but since time immemorial has also been used for skin and hair care, for tending wounds, and against rheumatism and arteriosclerosis. A wide range of plants, such as grasses and grain (particularly barley), as well as medicinal and aromatic plants, such as thyme, lavender, thistle and wild flowers, grow under the shade of the argan tree. They are either used for producing honey or the herbs and medicinal plants are gathered by the inhabitants.

The argan tree grows on the southern slopes of the Upper Atlas, on the northern slopes of the western Anti-Atlas and, in between these, in the broad basin of the Souss and Massa Rivers in south-west Morocco. This semi-arid to arid region is known as the Arganeraie. There are individual clusters of trees in a valley near Romani and in the Oujda region. The argan tree population in south-west Morocco covers a total area of approx. 800,000 hectares and presents a wide variety of characteristics. A density of 250 trees per hectare, 150km north of Agadir in the Upper Atlas, is not uncommon. There are however densities of under 40 trees per hectare which grow like bushes, in the desert border region near Gulimime in the Anti-Atlas. Natural tree stocks in Morocco are estimated to be between 150-250 years old.

The Arganeraie region (Fig. 10) comprises 6 provinces (Esssaouira, Taroudant, Agadir Ida-Outanane, Inezgane Ait Melloul, Chtouka Aït Baha and Tiznit) and, with the exception of Agadir (51%) has a low level of urbanisation (26%). Around 2 million people live in the Arganeraie region, with a population density of 46 people per square kilometre. As such, the Arganeraie is a sparsely inhabited region with strong focus on agriculture and forestry.

**Fig. 10: Distribution of the Argan Tree in Morocco**

The forests of the Arganeraie have been largely state-owned or communally-owned since the turn of the century. Their usage by the people living in and around them (predominantly Berber tribes) is regulated by a usufructuary law dating back to 1925 which was specially introduced for the argan forests. According to this law, the inhabitants of the Arganeraie have inheritable individual or collective usufructuary rights to graze, to engage in agriculture, to remove wood, to harvest the fruit and to remove sand, soil, stones, lime and other building materials.

During the main season for harvesting the fruit, between July and September, grazing is prohibited in the Arganeraie. The families of beneficiaries can gather the fallen, ripe fruit, dry it in the sun and store it. Each tree gives an annual yield of between 10-30 kg of fruit. Estimates of annual production of argan oil in the Arganeraie fluctuate between 2,500 and 4,000 tons, which corresponds to less than 2% of national edible oil consumption.<sup>58</sup>

Traditionally argan oil is obtained from the 2-3 kernels of the nut by women using a complicated hand-pressing process. Firstly, the dried fruit pulp is removed<sup>59</sup>, after which the nut is cracked between two stones, whereby the kernels should remain undamaged. The kernels are lightly roasted to enhance the nutty flavour and then ground in a stone quern. The oil is removed from the resulting oily paste by constant kneading and the addition of lukewarm water, and is then decanted. The remaining fruit pulp and leftover oilcake is a valuable source of livestock fodder. The nut shells are burned for heating or for toasting the kernels.

<sup>58</sup> Nouaim, 2005

<sup>59</sup> The removal of the fruit pulp was previously done by goats. They ate the fruit and when chewing the cud would spit out the nuts. The oil obtained from these kernels has a very strong taste and smell.

Around 38 kg of fruit or 2.6 kg of kernels are required to produce one litre of argan oil. The argan tree, and the entire Arganeraie system of land use, with its various products, especially argan oil, represents an important source of income for the rural population of Berber origin (Amazhir). Argan oil is also used for personal consumption. For 86% of the population in the Essaouira region it forms a regular part of their diet.<sup>60</sup>

The land use system in the Arganeraie is currently threatened by irreversible damage. The following, overlapping factors have led to a premature aging and decline in tree stocks: widespread agri-industrial farming of the Souss plain area; deforestation of large areas to clear space for building land, roads and other infrastructure; removal of firewood and timber; one-sided use of the tree to obtain fodder; and widescale felling by forestry and local authorities.<sup>61</sup> The consequences are a drop in the groundwater level, the depletion of flora and fauna and the weakening of their power to regenerate, and initial desertification.

As part of a GTZ-supported project "Projet Conservation et Développement de l'Arganeraie" (PCDA), a framework plan was worked out in 1997-1998, which led in December 1998 to the region being recognised worldwide, through UNESCO, as the "Arganeraie Biosphere Reserve". As such, the added value of the region is increased through the improved use of existing potential consistent with the goals of nature protection and landscape conservation. Those economic systems which distinguish themselves through environmental-friendliness and the managed use of resources are particularly being promoted.

## 4.2 Functions and Actors in the Argan Oil Value Chain

Given the major differences involved, it seems sensible to differentiate between two distinct argan oil value chains. The main difference is in the technique used for extracting the oil: either by hand or mechanically. Hand-pressing is less productive and is practiced in the villages. Mechanical pressing achieves a higher level of extraction<sup>62</sup> and greater labour productivity. A prerequisite for this, however, is a regular supply of kernels so that the press can work at full capacity. With this system, processing tends to shift to urban and periurban centres with the rural areas being used purely for the supply of the raw material. The actors and their roles in the various phases of both value chains are discussed in the following chapters.

### 4.2.1 Value Chain: Hand-Pressed Argan Oil

The value chain for hand-pressed argan oil for the domestic and international markets is made up of seven steps (Fig. 11): specific inputs, gathering in the wild, processing, treatment, marketing/export, retail and consumption both in the domestic and international markets.

Inputs include measures to promote the organisation of rural producers and processors, the formalisation and application of usufructuary rights, the adjustment of the legal framework, the monitoring of quality and observation of certification

<sup>60</sup> Nouaim (2005), P. 145

<sup>61</sup> Since a 1976 byelaw came into effect, argan tree stocks provide up to 80% of communal revenue for some rural communities.

<sup>62</sup> 100kg of dried fruit given 2.6 l of hand-pressed and 2.9l of machine-pressed edible oil.

standards, advanced exploration of improved cultivation and production techniques, higher product quality and further development of the end product.

Gathering in the wild includes gathering, drying and storing of fruit by those families who have usufructuary rights for the argan trees. The quantity of fruit gathered, per family, fluctuates considerably depending on location (productivity and tree density), ranging between 5 to 160 sacks (around 40kg of fruit per sack) per season.

The fruit is peeled, the nuts broken open, the kernels are sorted, roasted and hand-pressed. It takes around 24 hours to produce one litre of oil. These production steps are women's work and are carried out by women either within the family or in cooperatives which have been set up since the mid 1990s with the support of the GTZ. The number of members ranges from 20 to 60 women per cooperative. They almost exclusively process fruit from their own harvest/gathering. In 2005 there were around 30 recognised and active women's cooperatives, producing argan oil by hand in the Arganeraie region. One feature of these cooperatives is that they are usually located in less-accessible areas of the Arganeraie with relatively good stocks of argan trees.

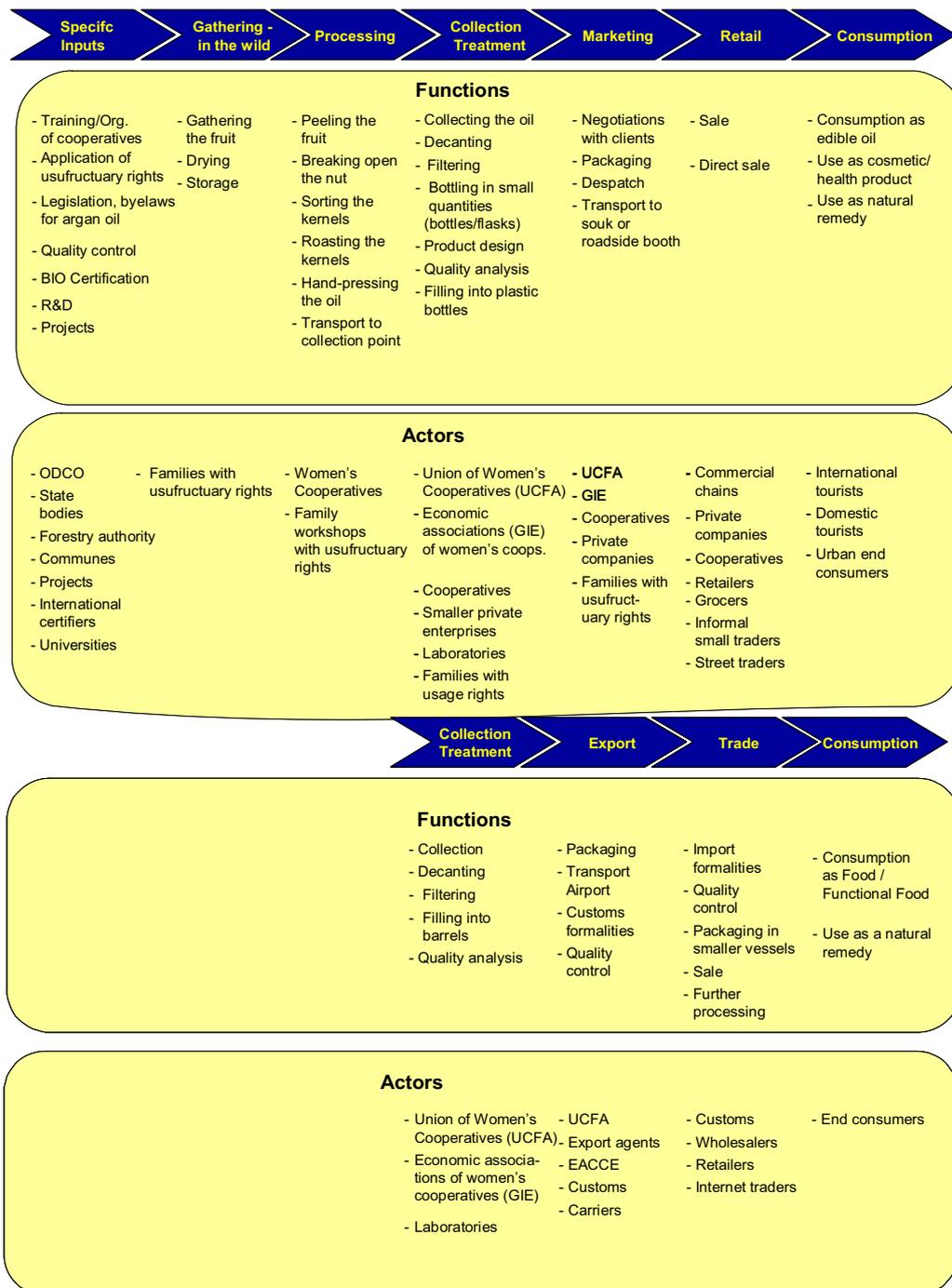
In the treatment phase, the hand-pressed oil is decanted, filtered and bottled. Again, these jobs are undertaken by the women in family-run enterprises, who fill the oil into used plastic bottles. The family will consume the oil itself or will give it to family and friends. Any surplus goes to the local market (souk), directly to the urban end consumer (production to order), to grocers, informal street traders or sold to small private companies in the tourist centres such as Agadir and Essaouira. Depending on season and demand, family enterprises may make between 3 and 8 Euro per litre<sup>63</sup> (summer, holidays, religious festivals).

The private traders in the tourist centres repackage the argan oil either as edible oil or as cosmetic oil to sell on to the international tourists, or process it further into natural remedies. They sell their products in their own boutiques with linked "health centres". The main target group for street traders, who place their booths on the main tourist routes, are domestic tourists, particularly Moroccan emigrants, who return to Morocco in great numbers during the summer.

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<sup>63</sup> The official minimum wage is 2,100 Dhs or around 200 Euro per month (5 day week, 8 working hours per day). On the basis of 22 working days, this gives a daily wage of 95 Dhs, about 9 Euro. Between 20-24 hours (3 days) are needed just to process the oil!

Fig. 11: Value Chain: Hand-Pressed Argan Oil in Morocco



Alongside a small number of individual cooperatives who use their proximity to the tourist routes to help their marketing efforts, the majority of women's cooperatives have formed umbrella organisations to treat and market the oil. In 1999 the first amalgamation of 5 women's cooperatives from four Arganeraie provinces, with the name "Union of Women's Cooperatives of the Arganeraie" (UCFA: *Union des Coopératives des Femmes de l'Arganeraie*) was founded with the help of the GTZ. The UCFA's main aim is to market high-grade argan oil from the Arganeraie biosphere reserve to obtain adequate income for the cooperative members. In 2002 the UCFA represented the interests of 13 rural women's cooperatives. Twelve further women's

cooperatives intend to become members of the UCFA in 2006. Since mid 2005, with support from the "Projet Arganier" initiative, which in turn is financed by the *Agence de Développement Social* (ADS) and the European Commission (EC), further amalgamations of traditionally working women's cooperatives, known as "Groupement d'Interêt Economique" (GIE) have been formed for the purpose of promoting the marketing of argan oil in the Arganeraie region.

The UCFA collects the oil, decants it over several days and then filters it in a modern filtration plant. Filling into bottles for the national market is done in a small bottling plant. The oil goes into larger containers of 5l each for export. Samples are taken at regular intervals from the collection containers of the individual cooperatives and are examined at a state-approved laboratory in Agadir, whereby the quality of the oil is checked against the prescribed national standard.<sup>64</sup> The UCFA holds regular hygiene courses for the cooperative members. It also coordinates the annual monitoring of the cooperatives which is carried out by an internationally recognised certification company, in line with the EU Regulation on Organic Production. The cooperatives receive approx. 12 Euro per litre of oil from the UCFA and also share in the profits.

The UCFA sells the hand-pressed argan oil on the domestic market in containers of 0.75l or 3.75l, for a price of 20 Euro per litre under the registered brand name "Tissaliwine". The buyers are big commercial chains or retailers. Argan oil is expensive compared with other edible oils. Consumers are therefore households with high disposable income in Morocco's bigger cities. Here it comes into competition with the cheaper, mechanically-pressed argan oil from the private companies. This oil does not always have the same high quality since it is made from purchased kernels, whose origin (pre-digested by an animal or removed from the fruit) cannot always be adequately traced.

At present the UCFA is the main exporter of hand-pressed argan oil. In future, the newly-established amalgamations of women's cooperatives (GIE) will take this marketing route as well. Monitoring of the goods being exported is the responsibility of the *Etablissement Autonome de Contrôle et de Coordination des Exportations* (EACCE), which guarantees that foodstuffs produced in Morocco conform with international market guidelines. It regularly tests oil samples of the produce being exported. As there was neither a national nor an international norm for argan oil prior to 2004, the test samples were measured against the existing olive oil standards. At the beginning of 2005 the Moroccan standards authority - *Service de Normalisation Industrielle Marocaine* (SNIMA) - published the Moroccan standard for argan oil (NM 08.5.090). Up to now, however, it is not yet legally binding.

The oil goes primarily to retailers, wholesalers and online traders in Europe. The hand-pressed argan oil is sold as an organic product in Europe. It is consumed as a premium edible oil or functional food, since it is scientifically proven to reduce cholesterol, or used as a natural remedy (pharmacies). The end users are predominantly food and/or health-conscious consumers (BIO, Slow Food, etc.) as well as gourmets and upmarket restaurants.

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<sup>64</sup> Moroccan Standard NM 08.5.090

## 4.2.2 Value Chain: Mechanically-Pressed Argan Oil

The mechanisation of argan oil production began in the mid 1990s with the use of locally developed, simple shelling and roasting facilities, as well as the import from Germany of screw presses and their reproduction in Morocco. These changes were driven by private enterprises in Casablanca, France and Switzerland as well as by researchers at the various Moroccan universities.

With funding from international donors (incl. Canada, Belgium, OXFAM, the Principality of Monaco), the *Association Ibn-Al Beithar* has since 1995 been accompanying the establishment of an initial six semi-mechanised women's cooperatives. In total, there are now ten such cooperatives in operation. In contrast to the traditional women's cooperatives, the semi-mechanised cooperatives are usually located on the main tourist routes and not in the areas where the argan fruit is gathered. This means that, in addition to whatever fruit the members have themselves gather, fruit also has to be bought in, so that the high capacity of the presses can be fully exploited.

Apart from the semi-mechanised cooperatives, there were 16 mechanically-operating, private oil presses at the end of 2005, five of which are the market leaders with headquarters and production facilities in Casablanca.<sup>65</sup>

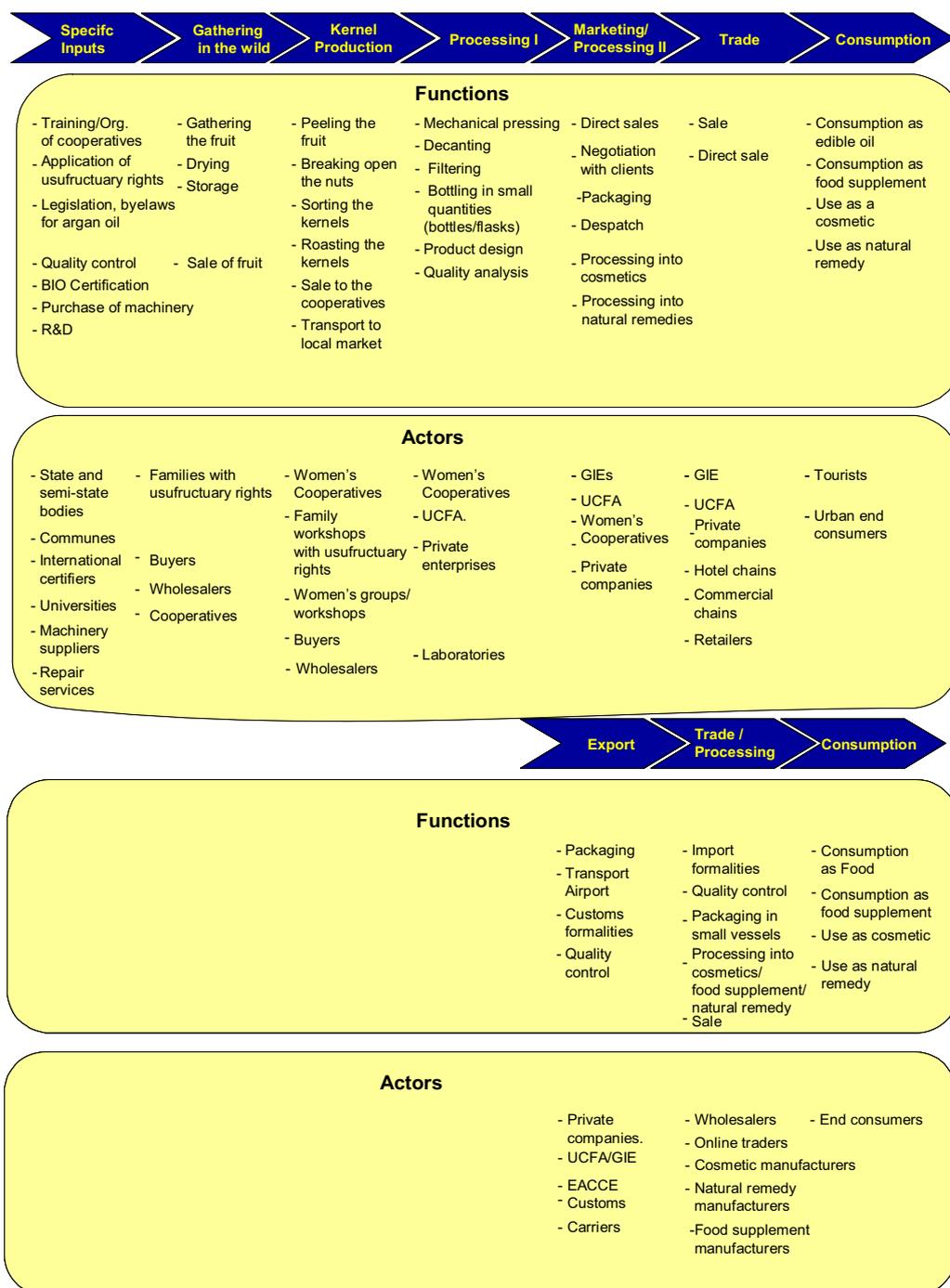
Through the mechanisation of the pressing process, two new raw material markets have been formed: the market for argan fruit, which primarily supplies the semi-mechanised women's cooperatives, and the market for argan kernels, which are bought by the private oil presses. Differently to the hand-pressing process, the rural families who have usufructuary rights in the main argan-growing areas of the Arganeraie are purely suppliers of the raw material. The *Association Ibn-Al Beithar* has been trying since 2004 through the formation of so-called *Coopératives de Concassage* (Women's Cooperatives for breaking open nuts), to bypass the intermediate traders and wholesalers and to link the argan-growing areas with the oil presses of the semi-mechanised cooperatives, also an important factor in terms of organic certification.

To ensure that kernels pre-digested by goats or other ruminants are not used for oil production, the semi-mechanised women's cooperatives buy dried fruit or process the kernels supplied by the *Coopératives de Concassage*. Dried fruit offer the advantage that they can be stored for up to five years. They provide work to the cooperative members and to women's groups who sub-contract their labour to the cooperatives, as this work process is not yet mechanised. A woman's maximum daily output working 8 hours non-stop, is 21kg, i.e. 1.5kg of kernels. The women receive between 35-45 Dhs (3-4 Euro) per kilo of kernels. Purchase of the fruit from the families with usufructuary rights is primarily in the hands of the wholesalers, who work with a network of small buyers. These, in turn, buy directly from the families or at the local markets of the main growing areas in the Arganeraie. The direct purchase of fruit by buyers working for the women's cooperatives is rare, owing to a lack of funds for pre-financing the purchases.

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<sup>65</sup> It is estimated that private companies sell twice as much argan oil on the official domestic market than do the cooperatives and their amalgamated organisations.

Fig. 12: Value Chain: Mechanically-Pressed Argan Oil in Morocco



The kernel market is primarily based on personal relationships between producers and traders. The kernels are produced by the families with usufructuary rights, whereby it cannot be ruled out that they also mix in kernels which have been pre-digested by their livestock. The buyers ex-farm are often acquaintances or relatives of the family, whilst the wholesaler does his buying at the local weekly markets (souks). The owners of private, mechanical presses and retailers are regular buyers of the kernels. This means that the private presses leave the peeling and breaking open of the nuts to the family enterprises. In 2005, a family would receive between 15-20 Dhs

(1.40-1.80 Euro) per kilo of kernels. Unlike the dried fruit, the kernels cannot be stored for long,<sup>66</sup> although this also depends on the right storage (dark and dry).

The private companies and the cooperatives work with screw presses. Only one private company is known to work with industrial plant which obtains the argan oil through solvent extraction (e.g. with hexane)<sup>67</sup>.

Two types of oil are manufactured:

- Oil from roasted kernels (edible oil) and
- Oil from unroasted kernels which is primarily used for cosmetics, as a food supplement or as an edible oil (USA).

A screw press can produce up to 50l of argan oil per day. For this, 120kg of kernels or 1,720kg of dried fruit are required. About twice as much oil can be extracted from unroasted kernels using mechanical-pressing as by hand-pressing. The UCFA works with a screw press to extract cosmetic oil from unroasted kernels. Filtering and bottling is also done mechanically. Young women or men with professional training are responsible for the operation and maintenance of the presses.

The semi-mechanised women's cooperatives sell the edible and cosmetic oil directly at the production site to international tourists or sell it in Morocco via retailers and hotel and commercial chains. In 2004 the first four cooperatives formed the GIE *Targanine*. In 2005, two further semi-mechanised women's cooperatives were founded. These registered GIEs (economic interest groups) sell the oil products of the member cooperatives within Morocco but their main target is international sales. Like the UCFA, they assure quality and organic certification, deal with export formalities with the help of agents, make contacts and source new clients. The edible oil is bought by wholesalers, retailers and online traders, whilst the oil from the unroasted kernels is sold to processing industries (manufacturers of cosmetics, natural remedies and food supplements) in Europe, Canada/USA and Japan.

The big private oil presses process part of the oil from unroasted kernels into cosmetic products (soap, skin cream, shampoo, etc.) and a smaller quantity into natural remedies (creams for the treatment of skin problems). A further part of the oil is sold directly as oil for the skin or is sold blended with aromatic oils. A few private companies sell their products in their own shops in the tourist areas or cities; others supply the retail trade, bigger commercial and hotel chains, as well as duty free shops and airlines. As they buy in the raw material very cheaply, they are in a position to offer their products at a much lower price than the manufacturers who work by hand. In addition, the private companies have easier access to loans, are better organised and do not need to pay so much attention to social aspects. In spite of inadequate verification of the gathering areas, the private companies were given organic certification under EU Regulation No. 2092/91.

The private companies sell their products under both their own names and under brand names whereby the image of oil-producing women in the Arganeraie has found its way into commercial advertising, without these women having any share in the added value. Thus the image of the producers of a high-grade, premium end

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<sup>66</sup> Max. 3 weeks according to Charrouf

<sup>67</sup> pursuant to SNIMA (*Service de Normalisation Industrielle Marocaine*) standard, this oil is not allowed to be designated as argan oil. This standard is, however, not yet legally binding.

product is being used to market cheap oil from the private presses in Casablanca, Marrakesh and Agadir.

The end user group for mechanically-pressed oil in Morocco and abroad is the same as that which buys the hand-pressed oil. The end consumer is often unaware of the difference between the oils in terms of quality, or the varying levels of labour-intensiveness required to produce each type.

### 4.3 Support Measures and Findings in Argan Oil Production

Since the beginning of the 1990s Moroccan state institutions, in cooperation with international donors and NGOs, have been promoting the production, processing and marketing of argan oil.

The GTZ-supported project, *Conservation et Développement de l'Arganeraie* (PCDA) was active in the Arganeraie from 1995 to 2002. Its main aim was the creation and implementation of a framework plan for the recognition, through UNESCO, of the region as a biosphere reserve. This framework plan was worked out in conjunction with state, semi-state and nongovernmental bodies, private individuals and the rural community. In December 1998, the Arganeraie was recognised as a biosphere reserve. The development strategy within the framework plan foresaw an increase in the value of existing potential in the region, consistent with the principles of nature protection and landscape conservation. Economic forms which distinguished themselves through environmental-friendliness and management of natural resources were given priority. Alongside the production of single-flower honey and young fattening goats, the production of hand-pressed argan oil was considered to be particularly suitable in terms of increasing family income and contributing to the conservation of the argan tree population.

Apart from the demarcation of the forest domains within the Arganeraie, however, the framework plan for the biosphere reserve had still not been implemented by the beginning of 2006. The state, semi-state and communal organisations have been unable to reach agreement on competencies. There is a danger that the inability of these bodies to reach agreement may lead to the loss of biosphere reserve status in 2008.

Domestic research institutions, in cooperation with their international counterparts, played an important role in the development of argan oil products. Since the beginning of the 1970s, this research has achieved significant results:

- ➔ die plant sociology of the Arganeraie has been catalogued,
- ➔ the geographic distribution of *Argania spinosa* is known,
- ➔ the phenology and physiology of *Argania spinosa* has been researched,
- ➔ the genetic structure has been investigated,
- ➔ the propagation method of *Argania spinosa* is known today,
- ➔ the regeneration characteristics and the husbandry of existing stocks have been improved,
- ➔ the various uses of the argan tree and the related sociological aspects have been described,
- ➔ the chemical and dietetic composition of the kernels, the argan oil and the secondary products such as pulp, oilcake and shells have been investigated,
- ➔ the pharmacological and cosmetic uses of the oil, its secondary products and other parts of the plant (leaves, flowers and bark) have been investigated,

- oil production has been further mechanised.

Experience shows, however, that the rural population of the Arganeraie are only rarely involved in research activities and are hardly ever informed about the findings. Research findings are primarily used for scientific purposes, for publications, or for the patenting of active ingredients by domestic researchers.

Research activities aroused domestic and international interest in argan oil and the land usage system in the Arganeraie. With the assistance of international donors, as well as international and domestic NGOs, the establishment of women's cooperatives was supported in close cooperation with the forestry authorities and the *Office de Développement des Coopératives*. Awareness was created amongst men and women, using participative methods, and they were then involved through the formation of so-called *Associations de Développement* (village development associations). These associations accompanied and supported the establishment of the women's cooperatives whose members, by and large, could neither read nor write, and spoke only Berber. The involvement of the men was particularly important, as without their approval, there would have been no access to the women. Three types of women's cooperative were established:

1. Women's cooperatives set up in the main argan-growing areas, producing hand-pressed argan oil;
2. Women's cooperatives in semi-urban areas, producing mechanically-pressed argan oil; and
3. Women's cooperatives in the main argan-growing areas, supplying kernels to the cooperatives in semi-urban areas - so-called *Coopératives de Concassage*.

For cooperatives to function well it is imperative that annual general meetings are held every year to present the annual report and accounts, to approve the actions of the Board, to create a working plan for the following year and to provide the opportunity to de-select the Board. To date, hardly any of the cooperatives hold an Annual General Meeting, although they are required to do so by law. As such, the Boards of many cooperatives have neither given account of themselves since establishment, nor have they have been re-elected or replaced. Between 1997 and 2000 PCDA, together with the state agency *Office de Développement des Coopératives* (ODCO) provided courses to the cooperatives in the areas of cooperative principles, internal organisation and management of cooperatives, hygiene and organic certification.

Basic and further education in the form of functional literacy training and practice-oriented advanced training course are important elements of the development and broadening of the abilities of the female cooperative members. They are a prerequisite for the functioning of the women's cooperatives in the Arganeraie. Alongside courses on general management of cooperatives, there is also training in the workflow organisation in oil production (by hand or mechanical), hygiene, product quality, economics and marketing, planting of tree nurseries, planting and care of argan trees and conservationist harvesting of the fruit. To assure the women's participation at these educational events, it was important that the courses fitted into the women's daily schedule. Whilst working for the *Association Ibn-Al Beithar*, the national NGO, *Centre National de Développement et d'Alphabétisation* (CNDA) found that the following factors have a particular influence on achieving effective learning:

- ➔ the use of well-trained female trainers from the region, who get regular coaching;
- ➔ the use of tested visual aids;
- ➔ the active participation of the women in the course; and
- ➔ a sufficiently long duration for the training measures accompanied by systematic tracer studies to monitor learning effectiveness.

The CNDA intends to continue this approach as part of its cooperation with the ADS/European Commission *Projet Arganiers* and the Mohammed V Foundation.

The material project assistance given to the traditional cooperatives was limited to instruments for the improvement of work processes and hygiene and the provision of containers for the collection and decanting of oil and of sacks for the kernels. The practicality of shelling and roasting machines was successfully tested with selected cooperatives of this type. Women's cooperatives were furnished with these machines and other means of production at the end of 2005 under *Projet Arganier* subsidy agreements.

The equipping of the semi-mechanised women's cooperatives (shelling and roasting machine, screw press, filtering equipment, filling and capping machinery, etc.) was 100% financed by donors. This occurred mostly without either cost-benefit analysis or any concept for the medium-term independence of the cooperatives being undertaken. Owing to a lack of good operation and maintenance, the service life of the machines, especially the press, was very short. This meant that the cooperatives were dependent on external financing or subsidies. In addition, this type of cooperative requires a high level of management experience to coordinate the various processing steps and the maintenance of the machinery. Because of their professional training and language knowledge, female managers in some cases not only take care of the day-to-day running of the business but also fulfil the role of directors. As such, the cooperative members are restricted to fulfilling work duties. The members therefore have more opportunities within the traditional women's cooperatives which are striving to progress towards mechanisation with their own efforts.

Since the end of 2004, the *Projet Arganier* has been working with representatives of the women's cooperatives, research experts and the private sector to create a good practices guideline for argan oil production (*Guide des Bonnes Pratiques de Fabrication*) for both types of pressing. This guideline is to be published and distributed in mid 2006. It represents an important cornerstone for the development and implementation of hygiene standards pursuant to HACCP (Hazard Analysis and Critical Control Point).

For the sustainability of the women's cooperatives, it is important that the oil is sold for a price which guarantees adequate payment to the members, covers the cooperative's management costs and contributes to the creation of a working fund. To facilitate market access for the traditional women's cooperatives, the Association of Women's Cooperatives in the Arganeraie (UCFA) was set up in June 1999 with support from the GTZ. At the outset, the UCFA received working capital and all necessary equipment from the GTZ. It also received support with regard to organic certification, to treat, bottle and market the argan oil produced by the cooperatives. An oil press was installed for the manufacture of argan oil from unroasted kernels. The technical advice given to the UCFA in the areas of organisational development, economics, marketing, labour organisation and product quality was provided for a period of three years. The

UCFA which, initially had little experience, only survived economically thanks to the working capital supplied by the GTZ, occasional assistance from the GTZ's next programme "*Programme d'Appui à la Mise en Oeuvre du Plan National de la Lutte Contre la Désertification PAN LCD*), donations from the Mohammed V Foundation and the involvement of Moroccan female ex-project workers. A partnership agreed in 2004 (private-private partnership) with a German marketing company, which also advises the Union, led to the sustained strengthening of the UCFA.

Further women's cooperatives with the aims of joint marketing, product development, creation of a common sales network, the bundling of equipment purchasing and joint certification, were set up in 2004 and 2005 with the support of the *Association Ibn-Al Beithar* and the *Project Arganier*. External decision-making by the support agencies and an unclear concept led to the withdrawal of the two biggest cooperatives one year later, and their subsequent amalgamation with other independent cooperatives to form a new GIE.

At the end of 2004, 28 cooperatives set up the National Association of Women's Cooperatives in the Arganeraie (ANCA) with support from the *Projet Arganier*. As the representative of the interests of all member cooperatives, ANCA's job is to strengthen the position of the cooperatives within the argan oil sector at regional and national level and to formulate and represent support measures vis-à-vis state and semi-state bodies. The establishment of ANCA was preceded by a long sensitisation campaign in which conflicting aspects, born out of differing development histories and loyalties to the individual cooperatives, had to be reconciled to reach a common purpose. In order to create a sustainably independent organisation, it was important that external decision-making by the former support agencies and male-dominated village associations be reduced to a minimum, so that autonomous development could take place.

The institutional framework for the production and marketing of argan oil has been strengthened by technical advice from the competent Moroccan state agencies<sup>68</sup> in working out the Moroccan product standard for argan oil (NM 08.5.090) and through the creation of Moroccan legislation on protected geographic designations of origin (IG, AOP, AOC) and ecological standards (Regulation on Organic Production). Technical advice is provided by the *Association Ibn-Al Beithar*, researchers at the Universities of Rabat, Casablanca and Agadir, the Mohammed VI Foundation (for research into and safeguarding of the Arganeraie), the *Project Arganier* and the *Institut National des Appellations d'Origine* in Paris (INAO). Together with ANCA, these actors at the same time tried to persuade the state bodies to introduce an export ban on unprocessed raw material (argan fruit, nuts and kernels).

With regard to inputs, support measures along the value chain focused on research, the formation of women's cooperatives and organic certification. In the areas of oil processing and treatment, resources and machinery were provided. In the area of marketing, the creation of cooperative umbrella associations was promoted. Economic areas (cost calculation and price structure), quality management, strategic marketing, negotiating and export were accorded less importance. Because of increasing exports of argan oil to Europe, Japan, Canada and the USA and the related requirement and/or

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<sup>68</sup> such as *Direction de la Protection des Végétaux, des Contrôles Techniques et de la Répression des Fraudes (DPVCTRF)*, *Office Marocain de la Propriété Industrielle et Commerciale (OMIC)*, *Service de Normalisation Industrielle Marocaine (SNIMA)* and *Etablissement Autonome de Contrôle et de Coordination des Exportations (EACCE)*

verification that international labelling regulations and quality standards are being observed, efforts are being made to improve the domestic legal and institutional framework.

#### 4.4 Results and Impact of Support Measures in Argan Oil Production

The inventorisation of the Arganeraie which took place as part of the creation of the framework plan for the Arganeraie Biosphere Reserve led, with the involvement of the local population, to the identification of state-owned argan tree stocks, which are protected by formal usufructuary rights. The number of argan tree seedlings in state-owned and newly created private tree nurseries in the Arganeraie has risen considerably. Alongside the state forestry services, the seedlings are also used by the women's cooperatives, associations for local development and local authorities to plant argan trees on private and publicly-owned land. Some private presses based outside the Arganeraie advertise for tree sponsorship on the internet to fund new planting.

The number of women's cooperatives producing argan oil in the Arganeraie is continuously increasing. At the end of 2005<sup>69</sup> around 70 cooperatives were registered with the *Office de Développement des Coopératives* and further women's cooperatives are waiting for accreditation. The majority of cooperatives established since 2004 belong to the *coopératives de Concassage*, which supply kernels to the semi-mechanised cooperatives. Alongside the number of new start-ups, membership in the existing women's cooperatives is also on the rise, whereby traditional and semi-mechanised cooperatives have about the same level of membership.

In 2005, aside from the UCFA set up in 1999, there were three further cooperative associations (GIE). The UCFA will be accepting as members 12 further cooperatives who produce hand-pressed argan oil and will thus increase its membership from 500 to 1,000 women. The cooperative associations in urban locations have very obvious competitive advantages over the individual cooperatives, especially in the areas of sales, marketing, quality control, product certification and export, and are more difficult to force out of the market. The four cooperative associations represent the interests of around 35 women's cooperatives.

The majority of newly-accredited cooperatives have applied for membership of the umbrella association, *Association Nationale des Coopératives d'Argane* (ANCA) which was set up by 28 cooperatives in November 2004. Both ANCA and female representatives of the cooperative associations are actively involved in establishing production standards for argan oil in order to obtain protected designations of origin (IG or AOC) and are calling for a legal ban on the export of raw materials.

In order to increase the production of high-grade argan oil, a combination of initial provision of equipment to the women's cooperatives, use of the quality handbook *Guide de Bonnes Pratiques de Fabrication*, establishment of a working fund for the replacement of machinery, and suitable basic and further training programmes were required. The 13 member cooperatives of the *Union des Coopératives des Femmes de l'Arganeraie* (UCFA) were able to increase their monthly output of hand-pressed argan oil from 500l in 2002 to 3,000l at the end of 2005.

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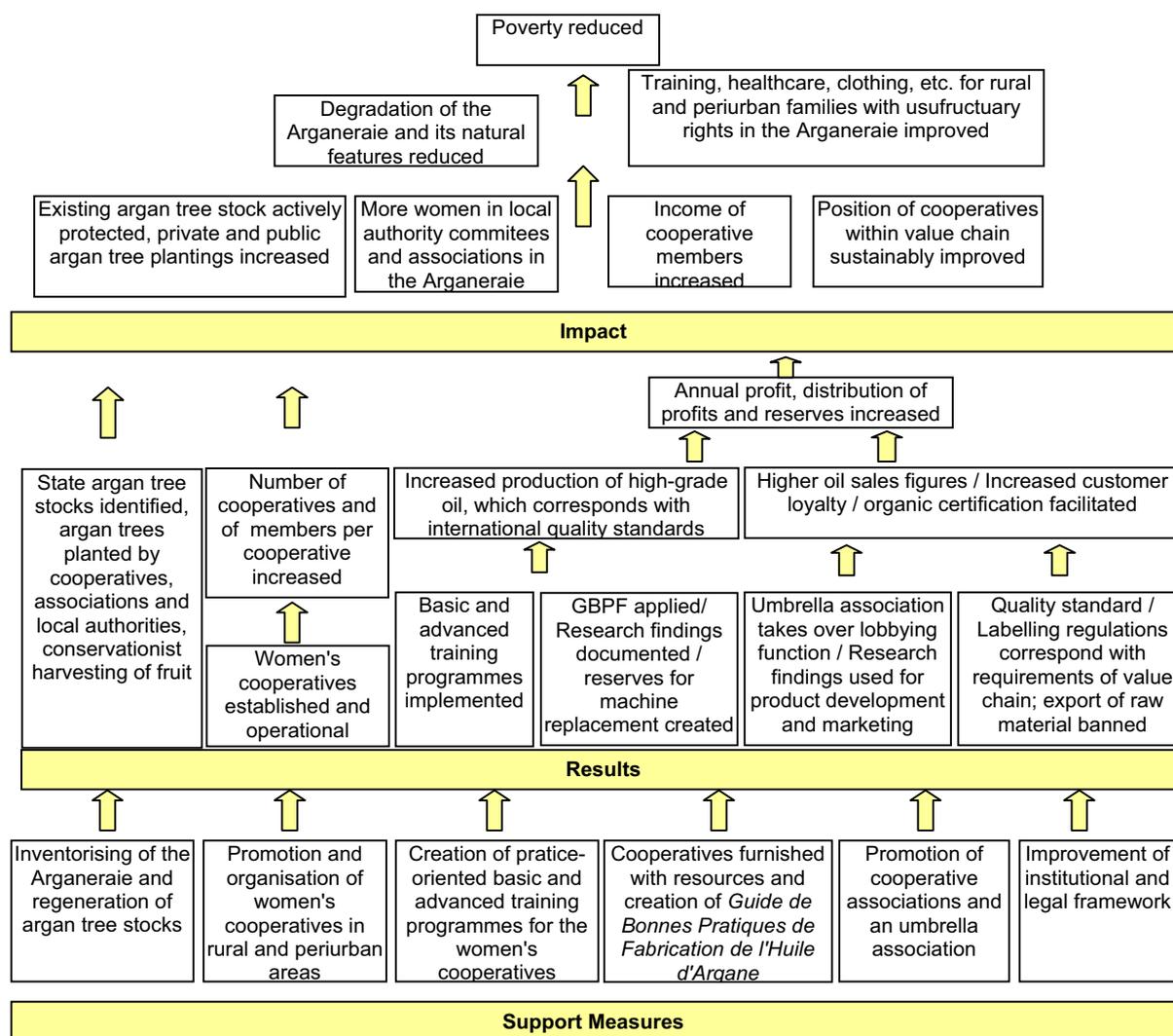
<sup>69</sup> 17 cooperatives were accredited in 2000.

According to statements by the cooperatives and their associations, sales figures have risen considerably in the last two years. The UCFA was able to increase its annual sales figure from around 5,500l in 2002/2003 to about 13,000l in the 2004/2005 business year. In the first three months of the 2005/2006 business year alone, it sold 9,500l. Over 90% of production goes to Germany under the terms of a private-private partnership.

Increased sales turnover and fast payment of exports means that the UCFA can pay its member cooperatives on a regular basis (domestic payments are often made only three months after delivery). This turnover also increases their annual profits which are distributed amongst the member cooperatives and form the basis of their reserves for future investments.

On the regional and national markets, the traditional and semi-mechanised cooperatives sell their edible oil in 250ml or 375ml bottles for between 25-40 Euro per litre; cosmetic oil is sold in 60ml flacons for about 5 Euro. In contrast, the private companies sell their edible oil for about 20 Euro per litre and the cosmetic oil for around half the price per flacon on the national market. There are obvious differences in quality between the two production groups. Thus, for example, the women's cooperatives are vigilant in ensuring that kernels pre-digested by livestock are not processed. This quality characteristic is less important to the Moroccan end consumers, but is all the more important in the area of export (see quality requirements).

Fig. 13: Value Chain: Argan Oil in Morocco



In view of increasing demand for high-quality argan oil and the rising number of women's cooperatives in rural and periurban areas, the active involvement of families with usufructuary rights in the protection of existing argan tree stocks is growing. Since they exercise pressure of public opinion on the local authorities, the latter have to find other sources of income apart from the sale of wood from publicly-owned argan stocks. Hundreds of hectares of argan forest are going to have to make way for the planned Marrakesh-Agadir motorway. According to the competent authorities, for each tree felled another is to be planted elsewhere. It will be the job of ANCA and other representatives of civil society to see that this promise is kept.

Apart from the conservation of existing argan tree stocks, there are first initiatives at cooperative, local development association and local authority level to undertake new plantings on private and publicly-owned land. One indicator of this is increased private demand for argan tree seedlings in the state-owned tree nurseries and the establishment of private tree nurseries. The main difficulty is that argan trees need a great deal of care in the first 2-3 years after planting (watering, protection from animal damage). Breeding at the research institutes is aiming for faster growth, earlier fruit-bearing and a thinner nutshell to make it easier to crack open the nuts.

The interest of families with usufructuary rights is explained through the positive effects at household level. The production of argan oil assures steady employment and income throughout the year. It is estimated that the majority of low-income rural households living in remote areas with the highest incidence of argan trees earn a significant portion of their annual income (up to 60%) from the sale of argan oil. Increasing numbers of rural households in the Arganeraie are being run by women because of migration of the male heads of household. For these women, argan oil is often the only source of income over which they themselves can dispose.

The majority of women, and the cooperatives in the Arganeraie are opposed to a mechanisation of the nut-opening process, even though some actors in the private sector and international NGOs favour it. The rural women and those in periurban areas, without education or training, fear that they will be forced out of the processing sector, lose their jobs and lose their share in the value chain's added value. Their function would be restricted to harvesting. This applies to the manufacture of mechanically-pressed argan oil. The production of hand-pressed high grade argan oil by the women's cooperatives, who jointly market their product, gives the rural women the largest share in the value creation process and thus makes an important contribution to both poverty reduction and the conservation of argan tree stocks.

The distribution of labour and income along the value chain needs to be regulated, on the one hand, by the actors in the various production phases and, on the other, by the Moroccan suppliers and their international buyers. There is a danger here that producers of traditional products, which have been developed over centuries, will not receive an appropriate share of the profits for the development of the products when they are introduced to the international markets. These traditional products are sometimes sold as the innovative developments of individual marketers, who protect the products with patents and charge licence fees for their use, without sharing the profits with the local communities who have carried out the real development work. Examples of biopiracy have been collated by McGown (2006) and include an example involving argan oil.<sup>70</sup> To prevent this, the ITPGRF<sup>71</sup> which makes the equitable sharing of benefits, already agreed under the 1992 Convention on Biodiversity, internationally binding<sup>72</sup>, was signed in 2001, although its practical application is not yet very advanced.

#### **4.5 Suitability of Argan Oil Production in Terms of Development Cooperation Objectives**

Because of the regionally limited occurrence of the multi-use *Argania spinosa* the production of argan oil is limited to Morocco and, within that country, to the Arganeraie Biosphere Reserve. Argan oil is a very high quality product which is used both as an edible oil and for cosmetics and skincare. The Berbers have regarded it since time immemorial as the elixir of life, using it to preserve beauty and maintain health. In Morocco, argan oil is a luxury product which was only used on special occasions. Its traditional production by Berber women in the Upper and Anti-Atlas was first described by Ibn-Al Beithar in 1219.

<sup>70</sup> McGown (2006), P. 16

<sup>71</sup> International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRF)

<sup>72</sup> [http://www2.gtz.de/agrobiodiv/download/Themenblaetter/ITPGR\\_dt.pdf](http://www2.gtz.de/agrobiodiv/download/Themenblaetter/ITPGR_dt.pdf)

The market trend towards new and exotic foods and products which meet the consumer's health, food culture and aesthetic needs, is decisive for the development of the argan oil value chain at domestic and international level. This trend made it possible to place argan oil on the market as a premium product, thus generating added value within the value chain for the rural population of the Arganeraie.

Interest from various domestic and international donors<sup>73</sup> in promoting the argan oil value chain was stimulated in the 1990s by the results of the 1992 Rio Earth Summit (UN Convention on Biological Diversity, UN Convention to Combat Desertification and the Statement of Forest Principles) and the legends surrounding the argan tree. Initial efforts concentrated on protection based on use in the Arganeraie. The promotion of the argan oil chain developed out of this.

The hand-pressed argan oil value chain fulfils numerous criteria for reducing poverty:

- the majority of rural families with usufructuary rights belong to the low-income group in Morocco;
- the beneficiaries often live in marginalised areas; the hand-pressing of oil is very labour-intensive;
- processing does not require any great capital investment; rural women are familiar with the processing steps;
- the families gather the raw material (gathering in the wild) and carry out further processing;
- the technique of manual oil extraction is passed on to the daughters in the family;
- adaptation of traditional oil production to international quality standards is achievable through training and the use of additional simple tools;
- regular income improves living conditions.

Support measures within the value chain facilitate the equality of the sexes and the political, economic and social participation of women, especially in the area of training.

- the formation of the women's cooperatives and their associations to strengthen their market position is accompanied by practice-related basic and advanced training programmes for women with and without formal education;
- the women's cooperative promotes communication and cooperation between the women of different families within a village or a community, and strengthens both their self-confidence and their social standing in the village community;
- the communication of knowledge on market functions, the importance of marketing, negotiating and their related costs and yields, strengthen the economic position of women in the value chain;
- the umbrella organisation, ANCA, is the representative of the political interests of the women's cooperatives at regional and national level.

Support measures also contribute to the protection of the environment and natural resources:

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<sup>73</sup> *Association Ibn Al Beithar, Enda Maghreb, OXFAM Canada, GTZ, ADS/EC, USAID, French and Belgian Embassies, Principality of Monaco, Mohammed V Foundation, Fondation Mohamed VI pour la Recherche et la Sauvegarde de l'Arganier, Fondation du Sud, Migration et Développement, etc.*

- Argan fruit continue to be gathered in the traditional manner by the rural population.
- The growing interest of the rural population in protecting and regenerating the argan tree stocks and planting new trees is a counterbalance to the annual loss of around 500 hectares of argan forest.
- The sustainable cultivation of the argan tree ensures the survival of many plants growing in its shadow, which are used by the inhabitants for livestock fodder, for producing honey and for aromatic and medicinal purposes.
- In December 1998, the Arganeraie region was recognised as a biosphere reserve by UNESCO. The reserve's framework plan foresees the designation of three separate zones (A, B and C) for different uses. The A zones focus on the conservation of self-contained forest areas, which as typical forest ecosystems represent conservation areas for flora and areas of sanctuary for fauna.

## 5 Grasscutter Farming in West Africa

### 5.1 Grasscutters in Context

The natural habitats of the grasscutter are the forest and savanna regions south of the Sahara with precipitation of 750-1,400 mm. The wild rats prefer areas of dense savanna grass, light tree vegetation, the edges of damp floodplains, swampy areas, sugar cane plantations and fields.

The grasscutter (or cane rat) belongs to the family of *Thryonomys* (also known as *Aulacodus*, *Triaulacodus* and *Choeromys*) and there are two species, *Thryonomis swinderianus* (great cane rat) and *T. gregorianus* (lesser cane rat). In Francophone West and Central Africa, grasscutters are known as agouti<sup>74</sup>. They reach weights of between 3 (females) and 4.5 kg (males) and feed on different savanna grasses, tree roots, fruit, grain and tubers. The animals reach maturity at the age of four-six months and bear 1-8 young per litter after a five-month gestation period.

Their natural enemies are snakes, wild cats and other carnivores. It is man, however, who is responsible for the greatest decline in the wild grasscutter population. In many countries, grasscutters are highly sought after by hunters as bushmeat. They are trapped, shot or poisoned with pesticides, the latter naturally being a highly dubious method in terms of consumption and which explains why some consumers prefer farmed animals. When hunting, bushfires are set regularly to scare out the animals and also to give easier access to areas of dense vegetation. It is not possible to estimate the overall population with any real accuracy. It is, however, clear that the pressure on grasscutters through hunting increases with rising levels of population, whilst their natural habitat is being reduced by appropriation of land for human use. Hunters in Benin report a decline of about 50% in the grasscutter population over the last 20 years<sup>75</sup>, which is more or less inversely proportionate to the increase in the human population.

In order to reduce the pressure on the wild grasscutter population and to exploit the existing economic potential through the high demand for grasscutter meat, breeding and farming experiments have been tried in several countries since the 1960s, although with only limited success. In Benin, the Ministry of Agriculture started farming in 1980 but ran into difficulties as little was known about the biology, reproduction, diet and health of the animals. From 1983 the Benin breeding station was supported by the GTZ, which was initially involved in research into the animal, its subsequent breeding, its introduction to livestock owners and national distribution. Between 2001 - 2003 regional distribution was then promoted. Numerous other state and private organisations, donors and research institutes in Benin and the neighbouring countries are meanwhile involved in promoting grasscutter farming.

Ghana, in particular, has meanwhile developed into a further centre for grasscutter farming. The number of livestock owners is also rising strongly in other countries, such as Nigeria. The following value chain describes farmed production. Supply provided by hunting wild rats is discussed only briefly. The evaluation is based largely on findings in Benin and Ghana.

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<sup>74</sup> The cane rat, however, has nothing in common with the South American agouti.

<sup>75</sup> Brüntrup & Aina, 1999, P. 16

## 5.2 Functions and Actors in the Grasscutter Value Chain

As it is first necessary to domesticate the wild animal before it can be farmed, development cooperation did not start with measures to assist livestock owners, but rather with intensive measures into investigating and developing this new production industry (see Step 1, Fig 14). In Benin, the first phase of research (1983-1994) was carried out at the breeding station of the Benin Ministry of Agriculture and then accompanied the field-work during the pilot farming projects from 1994.

During the first research phase the breeding station was expanded. Systematic husbandry and breeding experiments and investigations took place with the first group of wild rats. This work was carried out in close cooperation with the Universities of Hohenheim, Cotonou, Dakar and Lomé as well as a laboratory for animal feed in Côte d'Ivoire, another GTZ/EEF project.

A major problem in the initial phase was the wildness of the grasscutters whose marked flight instinct led to them being in a constant state of stress. This, combined with diseases and lack of housing, led to initial mortality rates of up to 40%. Therefore, questions of animal biology, feeding and animal health were explored. Selection characteristics had to be defined and recording methods developed. Finally, a systematic breeding programme to improve the animal's suitability for farming and to increase production was initiated.<sup>76</sup> There was clear progress made in terms of reducing stress in the animals; at the same time production rates and farming methods were improved. In 1994 it was finally possible to place the first animals bred in captivity in 100 rural pilot farms, to test grasscutter farming *in situ* and to increase the domesticated base group. The pilot farms were selected using strict criteria<sup>77</sup> and had to participate in the investment costs. The pilot farmers were given intensive training. Production and economic data were systematically collated in each of the farms and the first technical advice approaches were drafted.

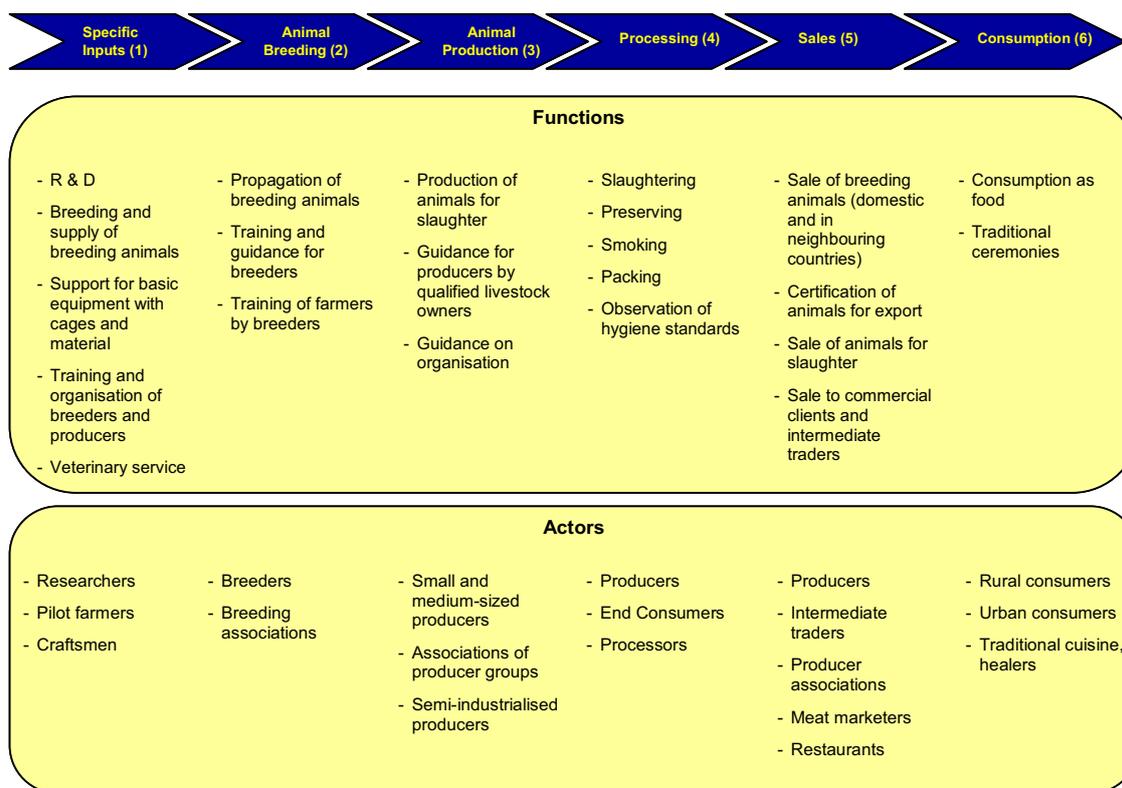
Another difficulty was the development of suitable housing. Farmers and researchers tested various materials and housing forms and their findings were incorporated into the technical advice corpus. In Ghana, craftsmen (masons, carpenters) were specifically involved in developing housing and their experience played a major part in increasing productivity.

The actual "animal breeding" component (Step 2, Fig. 14) within the new industrial branch of grasscutter production was developed with the selection of 22 intensive zones. Further breeders were trained in these intensive zones and they then received domesticated animals from the base group for propagation purposes. To make technical advice more efficient, qualified pilot breeders were trained as advisors. With some assistance, these first groups of farmers set up the National Grasscutter Association in Benin.

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<sup>76</sup> For example litter size, reproduction rates, trustingness of the animals, weight gains, mortality.

<sup>77</sup> Availability of personnel, availability of feed, good reputation in village, financial participation and willingness to collate M&E data.

**Fig. 14: Value Chain: Grasscutter Production in West Africa**

Experienced breeding businesses today work as training centres. Interested parties take part in a 2-4 week training course in these businesses and, on completion, receive a group of breeding animals, allowing them to start-up their own business. After their initial training, former apprentices often receive further guidance and are given preference with regard to receiving animals from the training centres.

Equally in Ghana, associations at provincial level have been formed with the help of German and other development agencies, offering services such as basic and advanced training, sale of animals for breeding and slaughter and specific expertise and inputs.

The animals from breeding enterprises are sold at a high price in groups mainly comprising four female and one male animal for breeding. As grasscutter production is still spreading, demand for breeding animals remains very high. Only surplus male animals and rejected female grasscutters are sold for slaughter at a low price (Step 3 of the value chain). The supply of animals for slaughter is therefore undertaken on the one hand by the breeding enterprises, who pass on all animals which cannot be used for breeding to the consumers for food. On the other hand, the first operations breeding animals for slaughter, with anything from several hundred to three thousand animals, have already been established. With increasing saturation of the market for breeding animals, the number of these production operations will increase, whilst a small number of specialised and well-run operations will concentrate on breeding. The majority of grasscutter farms are small-scale operations. In Benin, 70-80% of the farm operations have fewer than 100 animals and 19% have between 100-500 animals. Only 1% of these farms have more than 500 animals. 80% of the livestock owners are farmers, with the remainder being self-employed and civil servants. In Ghana,

grasscutter farming is more recent and therefore even more small-scale, with around 5,000 operations of which only very few have more than 100 animals.

The number of grasscutter farmers is growing fast. In the meantime, various organisations have involved themselves in the spread of grasscutter farming. In Benin, at least eight NGOs and projects, including BØRNEfonden, Songhai (USAID, DANIDA) and the GTZ were involved in grasscutter farming in 2004. The regional spread of animals and the supply of information to the neighbouring countries were also supported. Ghana and Nigeria, in particular, are currently experiencing a sudden boom in grasscutter breeding, with support from the GTZ, Heifer International, Action Aid and the FAO. In Ghana, the Ministry of Agriculture has published its own grasscutter promotion strategy.

Regions with very limited availability of land, where the freerange farming of small ruminants is restricted, are particularly suitable for the introduction of grasscutter farming. These areas can be both rural or on the peripheries of towns and cities.

Although grasscutter production is largely undertaken by male livestock owners, it is also suitable as a source of income for women. In Benin, in 2002 12% of the livestock owners were women. The figure had, however, reached 18% in 2000, when women were actively approached by the advisors. In Ghana, women make up about 20% of livestock owners. Many households can have access to grasscutter farming without resorting to subsidies. Especially poor households, however, can only enter the market if they are given start-up assistance. In Benin, the start-up investment is about 75 EUR for a breeding group of four animals, 60 EUR for a 3-week training course and 100 EUR for cages and incidentals. In Ghana, the total costs for a "starter pack" are estimated at around 500 EUR.

Processing of the animals (Step 4) is still not clearly defined. The animals are largely sold as fresh meat or sold live for subsequent slaughter by the end buyers. Otherwise slaughter is carried out by the livestock owners and their assistants directly before sale. Only a few big producers have access to freezers. Some operators smoke the meat to extend its life and to diversify their product range. There is no sale of jointed animal parts. Nor is there any standard packaging system for transport or sale.

Sale (Step 5) involves both breeding animals and those for slaughter. Breeding animals are sold by the breeders directly to other livestock owners. The breeding associations with their extended contacts, can act as mediators between interested parties (for example from neighbouring countries) and their own members, but do not have their own sales structure. Several thousand breeding animals, for example, have been supplied by Benin's breeders to Ghana, Nigeria and Côte d'Ivoire. Nigerian producers and traders regularly come with trucks to Benin to buy wholesale. This regional trade is, however, made much more difficult and expensive because of certification and border formalities.

The sale of animals for slaughter is usually from producer to end consumer. There are rarely intermediate traders from the towns to buy up animals from the producer. A few producers have direct contacts with commercial buyers in the towns, such as hotels and restaurants. The first initiatives have been started to informally sell smoked meat to African communities abroad.

Grasscutter meat is expensive in comparison to other meat. Buyers are therefore households with high disposable income in rural and, predominantly, urban areas, so that livestock owners close to the towns have an advantage. Because of its

taste and high status, grasscutter meat is particularly popular at social events. It is also said to have a positive effect against gout. Traditional healers especially, favour grasscutter meat, with one "Nana" in central Ghana buying several hundred grasscutters every month for himself and his traditional ceremonies.

Market studies and forecasts from Benin and Ghana suggest that the market for grasscutter meat will not have reached saturation point even in 20 years' time. It is estimated that 400,000 tons of bushmeat are sold in Ghana every year, about half of which is grasscutter meat (about 50 million animals). All restaurants and wholesalers surveyed said that their sales were meeting only about one-third of demand. This demand will continue to rise once the relatively high price declines in line with increased production.

A unique feature of the grasscutter value chain is the central role played by the farmers and their associations. They are the chain's linchpin. Because of extremely high demand, the scarcity of breeding animals and animals for slaughter and specialised know how in the new industry, they have been able to create a position for themselves, which makes it very attractive for beginners to join an association. The challenge facing these organisations in future will be to maintain and develop this position.

### **5.3 Support Measures and Findings in the Area of Grasscutter Production**

Important foundations which determine the success of grasscutter farming today were laid during the development phase. Research work took place in multi-disciplinary working groups, involving researchers from seven countries and with lively exchange between their institutions.<sup>78</sup> From the outset, it was deemed important that the farming system should require as few external inputs as possible. The initially very high animal mortality rate, for example, was reduced through hygiene and balanced feeding. Sick animals were experimentally treated with local natural remedies. These measures ensured an adequate level of animal health, thus reducing the financial risk for the livestock owner. In-house feed and household waste were given preference, so that grasscutter production was not dependent on external feed products. The consistent use of local materials for the barns reduced considerably the investment costs for barn construction, thus making farming accessible to less well-off households.

The real viability of the new branch of industry was, however, tested in an active research approach, through pilot farms. Here, it was extremely important that the right farmers be chosen: those who were willing to make an investment; participate creatively in problem-solving; and involve themselves in the intensive collection of data. Only the strict application of these selection criteria permitted the selection of an initial group of 100 pilot farms which, as a consequence, had a discontinuation rate of under 10%. A first group, which had been selected by the state advisory service was less successful and had a discontinuation rate of 37%. The farmers involved had high subsidy expectations and were less willing to make a personal commitment.

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<sup>78</sup> Collège Polytechnique Universitaire (CPU/ UAC), Faculté des Sciences Agronomiques (FSA/UAC), Institut National de Recherche Agricole du Bénin (INRAB), Université du Bénin, Togo, Hohenheim University, Germany; University of Lille, France, University of Dakar, Senegal, University of Abidjan, Côte d'Ivoire, University of Ibadan, Nigeria.

It was possible to achieve important progress and collect necessary basic data with the pilot farmers, using a systematic monitoring system which employed new methods and new operational and economic parameters. In this intensive introductory phase, it was important that the pilot farms were located close to the project and the breeding station. This concentration of the new breeders in 22 intensive zones allowed lively exchange amongst themselves and intensive individual support and guidance by the project. This meant that advisory costs could be kept down and the capacity of the breeding stations for baseline breeding extended.

In order to quickly increase the diffusion of grasscutter farming, somewhat different criteria were required for the choice of suitable candidates<sup>79</sup> and adjustments had to be made to the advanced training approach. Initially all interested parties were given a four-week intensive training course at the breeding station. After construction of their own barns, they then received a breeding group for which they had already made a down payment. This very intensive training in the initial phase promoted the creation of training modules and material, which were also of use later on. The training was, however, only available to those people who could afford to spend the time and money on a month-long advanced training course. Apart from that, the training facilities at the breeding station were very limited.

It proved possible to increase capacity considerably by involving successful breeders in training. Using the project's existing training material, successful breeders intensively trained new farmers on their own farms in 2-3 weeks. Afterwards, the trainees received monthly, and later quarterly, coaching visits from their trainers. The trainees pay the trainers either with money or with labour. The trainees receive their first breeding group on completion of training from the "Master" farms. Access to training was greatly eased by this "farmer to farmer coaching", as the training farms were located in villages and the duration of training was shortened. The quality of training, however, greatly depends on the "Master's" level of experience. Training of new farmers also opens up another source of income to the master farms.

A further intensification of the spread in farming was brought about by the training of trainers, who were given an intensive course in technical issues and basic pedagogy, as well as training material. The trainers come from the domestic and international partner organisations. Through them, further multiplier centres for grasscutter farming were created.

An important element for the structuring of the new industry was the organisation of livestock owners into breeding clubs and associations. This eases the intensive exchange of experiences between breeders and the exchange of animals within and between the associations, necessary to prevent inbreeding. In order to ensure the geographical proximity of the farmers, several farmers in a given village were supported at any one time.

Experience shows that it was important to hand over full responsibility to the groups after an initial support phase. Extensionists too must withdraw after giving their advice and let the groups work independently. Well-functioning groups were those which allowed for a change in leadership and which had a programme geared towards the members' needs. The National Grasscutter Association, which was established

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<sup>79</sup> Training only available on request; cost-sharing in development and coaching; availability of family members for work; own plot of land for barn construction; access to sufficient feed; downpayment for breeding animals prior to training.

early on, suffered from too much external decision-making with the consequence that members left and formed their own association. These various associations (13 in Benin) meanwhile aspire to work together in an umbrella association. In Ghana, farmers in 6 provinces are organised and at national level there is a coordination committee under the aegis of the Ministry of Agriculture.

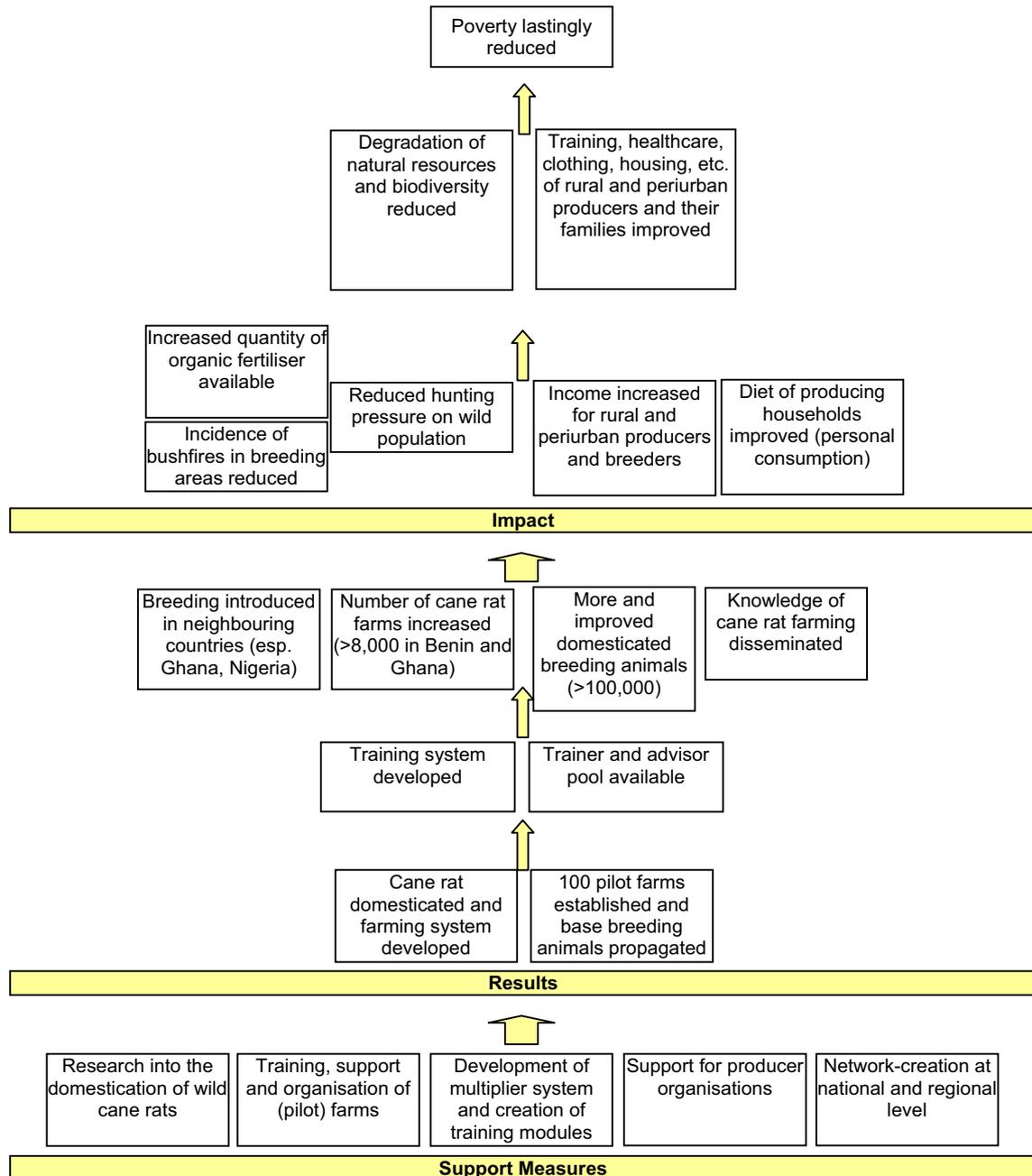
The final support phase of the Benin project served to further spread information on experiences in Benin at regional and international level. Firstly letters were sent to known grasscutter initiatives in the neighbouring countries, but without any great success. It was only with an international conference, initiated by the project, that personal contacts amongst the various actors were forged, thus improving network-building. Intensive relations with Ghana and Nigeria, in particular, were established.

Support for grasscutter production along the value chain was primarily focused on initial research, domestication of the animals, their improved breeding, and the development of farming methods. Afterwards, intensive support was given to training the farmers and the spread of farming. Few activities were undertaken in the areas of processing and sales.

## **5.4 Results and Impact of Support Measures in Grasscutter Production**

Support for the grasscutter production industry started with the necessary research into the domestication of the wild animals at the breeding station and in cooperation with an initial 100 pilot farmers, who were intensively trained and received their breeding animals at a subsidised price (Fig. 15). These first pilot farmers and other high-performance producers formed a trainer pool which, through a farmer-to-farmer training and advisory system, achieved a rapid increase in both the number of farms and the availability of breeding animals.

Fig. 15: Value Chain: Grasscutter Production in West Africa



The exchange of animals and experience was facilitated by the organisation of producers into associations. The training of trainers from partner organisations and the promotion of local and regional contacts created new multiplier centres within the country and, later, in the neighbouring countries.

This snowball system allowed the fast spread of the production system, which continues today. Thus the number of operations rose from the initial 100 pilot farms set up in 1994, to an estimated 600 operations with 18,000 animals in 2000.<sup>80</sup> Stocks in

<sup>80</sup> of these, 346 operations with 10,662 animals were registered.

neighbouring countries which come from Benin breeding animals are estimated at a further 4-5,000 animals. Training was carried out almost exclusively by the farmers themselves. Up to 2003, the number of operations in Benin had risen to 3,200 with stocks of about 72,000 animals. Breeding stocks in the neighbouring countries were estimated at a further 15,000 animals in 2003.

Ghana, in particular, has since seen a boom in grasscutters. The first farming experiments date back to the 1960s but were not crowned by any notable success. In the meantime over 200 state, church and private organisations and institutions are supporting grasscutter farming with various measures. Over 4,000 farmers have meanwhile been trained, of whom 60% have already started farming. Overall, there are around 5,000 farmers in Ghana with over 25,000 animals.

In view of strong demand, it is clear that present levels of farming are not having any great impact on reducing pressure on the wild population from hunting. The impact is currently still low, as breeding stocks are still being built up, so that predominantly surplus males and old animals are being sold for slaughter. Nevertheless, animal stocks of 70,000 animals in Benin still manage to produce about 250,000 young every year. However, with only certain animals being given for slaughter, this covers only a small part of national demand.

Interestingly, there are suggestions that grasscutter farming has brought about a reduction in the incidence of bushfires. Grasscutter farmers publicly designate common areas from which they harvest grass fodder, and they take care that these areas are not burned.

That livestock owners are so interested in grasscutter farming has, however, less to do with environmental impact, than with the positive effects at operational and household level. Grasscutter farming is a remarkably profitable investment. Latest calculations of profitability suggest that there is a domestic return of 20-40% on animals for slaughter<sup>81</sup> with prices at around 3 EUR per kilo live weight. The domestic return on breeding animals, however, which currently plays a significant role, is in excess of 1,000%. Young animals of 6-8 weeks cost 15-30 EUR each. It is estimated that small operations with up to 100 animals generate over 50% of their annual income with grasscutters.

The enormous income potential also explains the very low discontinuation rate of under 10% amongst the farmers. The main causes of discontinuation are start-up difficulties because of insufficient experience and, later, feed or labour shortages. For rural households in particular, whose harvest-based income is very seasonable, grasscutter farming offers a financial reserve which provides ongoing access to cash or can be adjusted to fit in with times when high levels of cash are needed (e.g. start of school, holidays). The highest prices are achieved during the rainy season, when fewer grasscutters are available for hunting.

In Benin it is said that "one slaughtered grasscutter provides food for one day. One grasscutter sold is enough to buy food for a week". Female farmers in Ghana calculate that one grasscutter family is enough to pay for two children to go to school.

For a large number of households, grasscutter farming is an accessible source of income. It is also suitable for very poor households, once start-up help is available to

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<sup>81</sup> Communication: *Market Oriented Agricultural Programme*, Ghana und Niesen (2004)

cover the initial investment required. This start capital is often made available to selected groups by NGOs and civil or religious organisations.

Grasscutter farming is also suitable as an income-creation measure for women and (unemployed) young people. However, in married households women tend to be pushed out because of the high level of profitability. In such households, women and children have a higher burden of labour than men because of grasscutter farming. They are in particular responsible for gathering food for the animals and cleaning out the barns.

## **5.5 Suitability of Grasscutter Production in Terms of Development Cooperation Objectives**

Firstly, the promotion of grasscutter production demanded the creation of a new branch of industry, "Grasscutter Farming" which required long-term development work whereby the repeated possibility of complete failure had to be taken into consideration. That this long-term effort for the successful completion of the development work was made is, not least, thanks to the great dedication of the individuals involved and also to luck. On the whole, however, it is considered that projects which require such long start-up preparation work are unsuitable for development cooperation.

In the specific case of grasscutter farming, however, it proved possible to create a new branch of industry, which was suited to both rural and periurban areas. Small scale grasscutter farming is independent of land ownership and thus also suitable for landless households. The animal's food, principally grasses, represents hardly any threat to the human food supply.

It can be pursued equally by men, women and young people, after brief training. This training can be effectively implemented on a broad scale using a snowball method, whereby experienced breeders pass on their knowledge to others.

For particularly poor households, grasscutter farming is only possible if an initial investment for training and a starter package (barn, incidentals and the first breeders) is made available. Although grasscutter production can also be implemented at agri-industrial level, so far farming has been practised by numerous small operations each with a few dozen animals. The advantages are therefore very widespread. At the same time, there is little intermediate trade at present, so that profits mainly go to the producers.

At the moment, the value chain has organised associations of producers and breeders only at producer level. The decision-making process is determined by the producer, as there is currently an enormous demand for both breeding animals and for meat. The organisation of the producers into associations opens up an autonomous development of this branch of industry and allows for the increasing participation of the members in the decision-making process, given that democratic principles are applied to a greater extent within these associations.

Demand for breeding animals and grasscutter meat is presently assured and it is predicted that this will remain the case for the next 10-20 years. Owing to the high level of demand, profits from grasscutter farming and, consequently, the contribution to household income, are very attractive although in the longer term, with increasing numbers of producers, a certain downturn is to be expected. Grasscutter farming can be organised in such a way that income can be generated all year round or only at

specific times when high levels of cash are needed (e.g. social events, start of the school year).

From a regional viewpoint, grasscutter production can be promoted in Africa's savanna and forest regions, whereby trade with breeding animals and meat can take place at regional or national level. Export to western niche markets is potentially possible but will require the implementation of increased standards of hygiene in order to be practised officially. At present, export business is irrelevant.

Through grasscutter farming, pressure on the wild population of grasscutters is eased and further positive environmental effects are evident (availability of organic fertiliser, reduced incidence of bush fires).

To summarise: grasscutter production for the improvement of economic dynamism in periruban and rural areas is also suitable for poor and disadvantaged groups (women, young people). It contributes to income and food security and improves access to social services. The beneficiaries are able to actively participate in the development of the sector. Grasscutter farming reduces the pressure of hunting on the wild population and contributes to the conservation of natural resources.

## 6 Characteristics of Value Chains and their Suitability for Development Cooperation Support Measures

International development cooperation has agreed to set common goals, which were defined in the New York Millennium Declaration in 2000, the Monterrey Conference (2002) and the Johannesburg Plan (2002). These were summarised for the German development cooperation agencies in the "Aktionsplan 2015", with the following goals:<sup>82</sup>

1. To increase the economic dynamism and active participation of the poor;
2. To achieve the right to food and introduce agricultural reforms;
3. To create fair trade opportunities for the developing countries;
4. To reduce debt and finance development;
5. To guarantee basic social services and strengthen social security;
6. To ensure access to essential resources and to promote an intact environment;
7. To achieve human rights and respect the agreed basic principles;
8. To promote gender equality;
9. To ensure the participation of the poor in social, political and economic life and to promote responsible government;
10. To resolve conflicts peacefully and to promote human security and disarmament.

To what extent the promotion of value chains can contribute to these goals, and to establish which value chains are particularly suitable, depends on various characteristics:

- ➔ The extension of the value chain influences the possible approach points for measures along the chain: Is the value chain restricted to a country or region or does it extend into the international market/can it be extended into several countries?
- ➔ The differentiation of the value chain into sub-chains: are there various strands which offer openings for support and income generation?
- ➔ Participation in the decision-making process in the value chain (governance): Is the value chain driven by the demand or the supply side? How does decision-making work within the chain, i.e. how great is the involvement of the individual players? How willing are important decision-makers to contribute to a fair balance of interests?
- ➔ The number and composition of the beneficiaries and the benefits for men and women: are the products manufactured by many small producers or only a few larger ones? Who are the main beneficiaries - women, men, the poor?
- ➔ Is access open to many through low capital intensity and simply-learned techniques? Can production be successfully implemented in marginalised areas where there are far more poor people?

<sup>82</sup> [http://www.bmz.de/de/ziele/politische\\_ziele/index.html](http://www.bmz.de/de/ziele/politische_ziele/index.html)

- ➔ The contribution made to food supply and/or to household income: What contribution do the approaches make towards food security and to ensuring the right to food? How high are the risks for the players and how consistently can they make a profit?
- ➔ The value chain's potential for growth: Is there adequate domestic and/or international demand?
- ➔ Does the value chain contribute to the conservation of biological diversity and to the management of natural resources? Are there alternative methods by which biological diversity may be sustainably used?

The following section outlines important differences between the four value chains discussed, as measured against some of the above mentioned characteristics. These characteristics may be used for the analysis of further value chains. The results are summarised in Table 4.

Value chains may be restricted to local level or they may extend into international markets. Accordingly, the number and type of actors involved changes. Because of the narrow market, limited lifespan and the weight-related high transport costs, traditional types of potato are primarily sold locally and nationally. Regional trade with neighbouring countries is of little significance. The actors involved are therefore the producers, i.e. small farmers in marginalised areas, local traders, processors and consumers. This is similarly the case for grasscutter production, which supplies fresh meat and breeding animals to the local and national market, whereby breeding animals are increasingly being sold across the borders to the neighbouring countries.

In contrast, the coffee and argan oil value chains extend into the international market. As such, in addition to the above-mentioned actors, there are further actors, e.g. exporters, international importers and retailers. This broadens the spectrum of potential support measures. For example, improvements for producers may be achieved not only through measures in the producing countries but also, and perhaps more efficiently, through negotiations with a small group of international buyers who drive the market or through raising awareness amongst the end consumers.

Value chains are different in the way they are subdivided. They may be simple, as is the case with grasscutter production, which alongside the sale of breeding stock also supplies fresh meat to local end consumers. They may, however, also be divided into a number of sub-chains, each of which has a different impact on important goals such as improved income, participation of women or conservation of biodiversity. The potato value chain has three sub-chains: (i) the sale of fresh potatoes; (ii) processing into traditional products (*chuño* and *tunta*); and (iii) processing into industrial products (chips and crisps). The first two sub-chains involve a large number of small producers using many types of indigenous potato. Promotion of these two sub-chains directly assists poor households, often in remote areas, and contributes to the conservation of the potato's genetic diversity. Only a few types of potato are suitable for the third sub-chain - industrial processing - and high quality standards have to be maintained by the producers. Promotion of this sub-chain tends to assist large and medium-sized specialised producers, the development of the food processing industry and the trade in local products with related job-creation. The biological diversity of the potato is not promoted by this sub-chain, indeed, it may even be demoted. The observation that on the one hand, genetic diversity is essential for the development of varieties and products of a high market value, while on the other hand such products, once developed, can lead to the suppression of diversity, specifically because of their high

market value, may be applied to other crops as well. Producers prefer to cultivate, wherever possible, crops with high returns rather than indigenous and traditional varieties offering only a low return.

Similar to the potato, the two sub-chains of hand-pressed and mechanically-pressed argan oil involve various actors and different effects. Mechanically-pressed argan oil is produced in urban centres by private enterprises who buy up rural production of the nuts. Hand-pressed argan oil, however, promotes the creation and maintenance of jobs for women in rural areas. The different product qualities of hand-pressed and mechanically-pressed oil mean that different markets are supplied. Whilst mechanically-pressed oil is also used to make soap because of its low price, hand-pressed oil is used for the manufacture of cosmetics.

Generally speaking, it may be said that genetic diversity is often conserved by small enterprises. As such, in rural areas, measures to reduce poverty and to conserve biodiversity in agriculture and food production often address those households.

There are differences within the value chains with regard to the level of influence enjoyed by the various actors. At present, grasscutter producers are supplying a market with excessive demand. As yet there is no competition amongst the producers and their number is limited, in contrast to the large number of coffee or potato producers. The farming of grasscutters also calls for a certain know how, which new farmers have to acquire through training with experienced producers. In addition, this branch of industry is not accessible to all households because of the size of the start-up investment. Assuming that the grasscutter farmers are well-organised, they can steer market access for new producers and thus regulate production volume and maintain high prices.

The potato, coffee and argan oil value chains described above are driven by demand. Production, especially with regard to coffee and potatoes, is divided amongst numerous, poorly-organised, small producers, whose production volume is in excess of demand. They are ranged against a few, large, international buyers who control the market. On the one hand, this allows the opportunity of negotiating with only a few buyers to achieve improvements for the many producers. On the other hand, the buyers must be willing to use their powerful position vis-à-vis the producers not as a means to force down prices, but rather to observe certain standards which will allow long-term socially, ecologically and economically sustainable production. Otherwise, improvements at producer level may be achieved through the organisation of the producers, creation of awareness amongst end consumers, product differentiation, improved quality, greater efficiency and political regulation.

The value chains also differ from each other in the way in which each product is rooted in the respective culture. Potatoes, coffee and the argan tree are traditional crops in the respective countries. This makes it easier to implement measures which raise awareness amongst producers, processors, traders and consumers with regard to the unique features of the product. The development of local labels and intensive marketing for local, traditional products can increase their market value and open up new markets or consolidate existing ones. This is particularly interesting given the rise of supermarkets in developing countries. Unlike in the local markets, the goods offered in the supermarkets have no link to the producer. In this profusion of "anonymous" products, certification and labelling which distinguish the product become all the more important.

In comparison, grasscutter breeding is a completely new industry, whose end product in some cases, had to assert itself in the face of prejudice. Thus many consumers still prefer grasscutter bushmeat to the farmed variety.

**Table 4: Characteristics of the Value Chains**

Criterion	Potato	Coffee	Argan Tree	Grasscutter
<b>General Criteria</b>				
Extension of the value chain	local, national, regional	national, international	local, national, international	local, national, regional
Division of value chain into sub-chains	high	medium	medium	low
Value chain driven by	demand	demand	demand	supply
Cultural Rooting	high	high	high	none
Use of traditional knowledge	+++	+++	+++	-
Number of actors involved in the value chain on production side	+++	+++	++	+
Number of actors involved in the value chain on buyer side	Consumers:+++ Industry: +	Roasters: + Consumers: +++	Processors: + Consumers: +	+++
Proportion of women beneficiaries	+	+	+++	-
<b>Economic Criteria</b>				
Potential for improving income	+	++	+	+++
Required start-up investment for producers	-	+	+	++
<b>Ecological Criteria</b>				
Biological diversity involved	c. 4,000 species	1 species with several 100 varieties	1 species with some varieties	2 species (T. swinderianus, T. gregorianus)
Difficulty of conservation in gene banks	+++	+++	+	+++

The distribution of the actors - producers, traders, processors, buyers and end consumers - is different in each value chain. Potato and coffee production and, to some extent, argan nut harvesting, is carried out by a large number of poorly trained and organised small farmers, often in remote areas. They however conserve the greater part of the genetic diversity. With regard to coffee in Ethiopia there is a small division of roles in processing and trade (buyers, wholesalers, exporters) before the coffee reaches the few, large, international buyers and roasters. This division of labour reflects how profits are distributed, so that the producers receive only a small share. Grasscutter producers belong to different social groups: civil servants and medium-sized enterprises close to towns and small, medium-sized and big farmers in rural areas. Very poor households only have access to this value chain if the cost of the start-up investment is borne by projects or aid organisations.

Special emphasis on the promotion of women is possible within the argan oil chain, as the work is almost exclusively performed by women. In grasscutter farming, on the other hand, few women are involved, whilst although their participation in the coffee and potato value chains is somewhat higher, it is not dominant, as only a small number of women are also company owners.

The impact of support measures along the value chains is determined by the achievable improvements in income and access. Measures which allow only small profits find less acceptance and are difficult to disseminate, whilst high profit potential clearly enhances take-up. Grasscutter production provides high profit and its present spread in west and central Africa resembles a boom, without any great external assistance. However, the high start-up investment required compared with coffee, argan oil and potatoes, in particular, means that access is prohibited to poorer households. Value chains with low start-up costs generally find take-up with larger and poorer target groups.

The suitability of the promotion of value chains for the conservation of biological diversity depends on the number of species and types involved. Argan oil production and grasscutter farming aim at the conservation of one and two species respectively, whilst the promotion of the potato and coffee value chains would conserve several hundred species or types. Accordingly, the impact on the conservation of biodiversity is quantitatively low for the first two chains, thus making the economic and social impact of support measures more important. In grasscutter farming, the species is directly protected by being conserved on farms. The protection of wild stocks is based on the hypothesis that an increase in farming will mean a reduction in hunting. Whether this will happen is uncertain, as hunting is only one of the reasons for the decline in the wild population. A further reason for the decline is the appropriation of land for human settlement and farming, which reduces the grasscutter's natural habitat.

The following measures were successfully applied to the four value chains. Their use with other chains should therefore be examined.

- In all four areas, the organisation of the producers into production and sales associations was important to permit exchange of experiences, strengthen the capacity of the members (e.g. by access to market information, loans, knowledge of quality standards and technology) and to strengthen the position of the producers.
- At least in the start-up phase, cooperation with research institutions was important, so that the biological, chemical and technical properties of the raw material and/or end products could be investigated and stocks inventorised. However, it was not always ensured that this information was passed on to the actors in the value chain, nor that the rights of ownership for the genetic resources and products remained in the hands of the local communities.
- In markets with excess supply, supply was better harmonised with demand and quality, rather than quantity, became the priority. Certification and the development of local brands were promoted and the development of alternative products and/or uses were pursued. At the same time, improvements in production and efficiency were promoted to reduce costs (disease-resistant breeds, better methods of cultivation). New (niche) markets were developed and partnerships between producers, processors,

traders and consumer groups initiated. To reduce heavy dependence on a single crop, support for diversified farming was provided.

- Parallel to attempts at conserving biodiversity *in situ*, the conservation of genetic resources in gene banks and nurseries was supported, as often only a part of the diversity could be conserved *in situ*. Further options included the establishment of protected zones (forest reserves with wild stocks, gardens, biosphere reserves).
- Before new methods or technologies were applied, they were tested in terms of their practicality and viability.
- Poorly educated target groups were supported with basic educational measures (literacy teaching).
- Alongside the direct support provided to producers, processors and traders, improvements to the regulatory framework and to standards were necessary: removal of legal obstacles; establishment of standards for processing and product quality; creation of analytical capacity and protection of ownership rights.

Prior to any decisions on support measures for value chains with the aim of conserving biological diversity being made, the following basic questions should be answered:

- Which groups (small farmers, women, gatherers) are conserving the diversity of the species being conserved?
- What sub-chains does or could the value chain have, and which ones would best contribute to the conservation of biological diversity?
- How broad is the genetic diversity being protected by the value chain and what other means of protection exist?
- How are the actors distributed within the value chain? How are they organised and what influence do they have?
- What added value is created by possible support measures (acceptance and take-up) and what obstacles to access are there (start-up investment, technical knowledge)?
- What opportunities exist for introducing formal regulations towards fair and equitable benefit sharing as prescribed by biodiversity conventions and ITPGRFA? With regard to the four products examined, no mention was made to benefit sharing, with the exception of the negative example in argan oil production cited by McGown (2006).

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