Climate smartness in agro-food standards

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Contents

Abbreviations

CSA	Climate-smart agriculture
FAO	United Nations Food and Agriculture Organisation
FLO	Fair Trade
GAP	Good agricultural practices
GHG	Greenhouse gases
GFP	Good farming practices
GMO	Genetically modified organism
GMP	Good manufacturing practice
IFOAM	International Federation of Organic Agriculture Movements
EU	European Union
IDH	Dutch Sustainable Trade Initiative
IFS	International Food Standard
ISO	International Organization for Standardization
REDD	Reducing Emissions from Deforestation and forest Degradation
SAN	Sustainable agriculture network
RSPO	Roundtable on Sustainable Palm Oil
B2C	Business to consumer
PPMs	Processes and production methods
B2B	Business to business
USDA	United States Department of Agriculture
VCS 2007	Voluntary Carbon Standard
WTO	World Trade Organization

Preface

This report contributes to the BO-10-020-003 project 'Aligning good agricultural practices and climate smart agriculture' commissioned by the Dutch Ministry of Economic Affairs and led by Plant Research International. The aim of this memorandum is to provide insight into the question who determines what is 'good' in terms of good agricultural practices (GAP) of agri-food standards. It also assesses the extent to which climate-smart practices are currently incorporated into good agricultural practices and how these could be further integrated.

Good agricultural practices are embraced in a range of certification schemes and standards adopted by the agri-food sector. There are many actors shaping and defining what are 'good' agricultural practices and for whom they are 'good' (farmers, consumers etc.). This occurs at many different levels and at different times and points in the cycle of development, implementation, use and evaluation of standards. A tendency towards 'top-down' definition of standards can be seen: that is, standards are defined by certification bodies, international organisations and consultative groups including experts, with some reference to members i.e. producer groups, rather than being bottom-up (from the farmer/producers).

The report reviews roles of different organisations in standard-setting procedures. There is a clear need for the involvement of not just all the different business and producer actors involved in private standards, but other stakeholders to become more engaged. This is particularly so for governments from consumer, end-of-the-chain countries but also producer countries, on the impacts of climate-smart GAPs. This includes the social-economic impact, implications for food safety, quality and security, and for competition and trade. The role of NGOs, consumer and work representative organisations and the research community is also critical to make climate-smart GAP work. Transparency, monitoring and impact evaluation are key aspects in making existing practices climate-smarter and developing new practices feasible and acceptable.

Implementing climate-smart agricultural (CSA) practices through existing certification schemes seems inevitable. Many whole-farm standards (oriented at farming practices) already include good agricultural practices and thus converting 'good' into 'climate smart' seems just one step away. However, climate relevance and impacts are only just starting to become a consideration in standards. The report illustrates how various private standards integrate and promote climate smartness in their codes of conduct. Climate smartness is currently not integrated into the majority of GAP in agri-food standards and these two streams of thought (GAP for environmental and social improvement and climate smartness) are largely separate.

The report concludes with identifying barriers to the adoption of climate-smart GAP. These vary and mirror general problems implementing GAP as part of standards and certification systems: difficulties to access land, a lack of land, problems of (climate-smart or improved) seed availability, the need for technical assistance and training to implement given practices and capital and labour constraints. CSA strategies need to be incorporated into legal and regulatory frameworks if they are to be implemented. Strategies also need to take account of current legislation and regulations. As standards become more and more international, a role for governments is to ensure science-based standards setting and the involvement of developing countries.

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1 Introduction

Climate change has the potential to undermine economic, environmental and energy related activities of agriculture. It can also hamper agricultural development by its impact on the natural resource base upon which agriculture depends (Halsnæs and Verhagen, 2007). Besides being directly impacted by climate change, agriculture also contributes to climate change through the emission of greenhouse gases (GHGs). Agricultural land accounts for approximately 15% of global anthropogenic gases, mainly methane and nitrous oxide. The role in the global carbon budget is linked to the burning of fossil fuels for electricity. Moreover, agriculture is also an important driver of land use change.

During the Conference on agriculture, Food security and Climate Change in The Hague, 2010 (http://www.afcconference.com/) the term 'Climate-Smart Agriculture (CSA)' was coined to achieve the 'triple win' of sustainable development, adaptation of agriculture to climate change, and reduction of GHG emissions. Although the link between sustainable development, agriculture and climate change is clear, the issues are still addressed separately at national and international policy levels. In an attempt to overcome the existing barriers among these inter-related issues, the FAO defined CSA as agriculture that sustainably increases productivity, resilience (adaptation), reduces/removes GHGs (mitigation), and enhances achievement of national food security and development goals (FAO, 2010).

This report contributes to the BO-10-020-003 project 'Aligning good agricultural practices and climate smart agriculture' commissioned by the Dutch Ministry of Economic Affairs. Good Agricultural Practices (GAP) are defined as practices that address environmental, economic and social sustainability for on-farm processes, and result in safe and quality food and non-food agricultural products (FAO, 2007). Because the goals of CSA in the end need to be realised by farmers, there have been attempts to link and integrate CSA and Good Agricultural Practices (GAP). The aim of this report is to provide insight into the question who determines what is 'good' in terms of good agricultural practices (GAP) of agri-food standards. It also assesses the extent to which climate smart practices are currently incorporated into good agricultural practices and how these could be further integrated.

Chapter 2 provides an overview of the standards, their modes of governance and the main players. Chapter 3 works out good agricultural practices (GAPs) and standards, while Chapter 4 focuses on the roles of stakeholders in agri-food standards and GAP. Chapter 5 elaborates on climate smartness in agro-food standards. The report is finalised with a discussion (ways forward: making agro-food standards climate smart) and concluding remarks.

2 Certification schemes and standards in agro-food sector

This section provides an overview of the standards, their modes of governance and the main players. This section highlights that there is a wide proliferation of standards and certification schemes in the agri-foods sector have evolved in the last few decades. These range from voluntary to mandatory schemes and include private and voluntary schemes, market-based private and public standards.

Good agricultural practices (GAP) are embraced in a range of certification schemes and standards adopted by the agri-food sector. A historic overview of these schemes helps understand why these schemes emerged, how they are used and whether CSA is integrated into existing standards and is further necessary.

Box 2.1	**Good Agricultural Practices**
Good Agricultural Practices (GAP) are differing, sometimes competing sets of codes, standards and regulations developed by governments, NGOs and the private sector. The most well-known definition from the FAO is that these are practices designed to address environmental, economic and social sustainability of on-farm processes and result in safe and quality food and non-food agricultural products. They concern improving the sustainability of agriculture in different ways including conserving natural resources, improving food quality and safety, social aspects such as labour conditions and safety, creating new market opportunities for farmers and improving traceability. They can be voluntarily adopted by farmers, producers, suppliers and retailers in the agro-food chain. Different organisations offer certification based upon GAP, based on farmers adopting and implementing GAP in their production processes, audits and inspections of documentation and processes.	

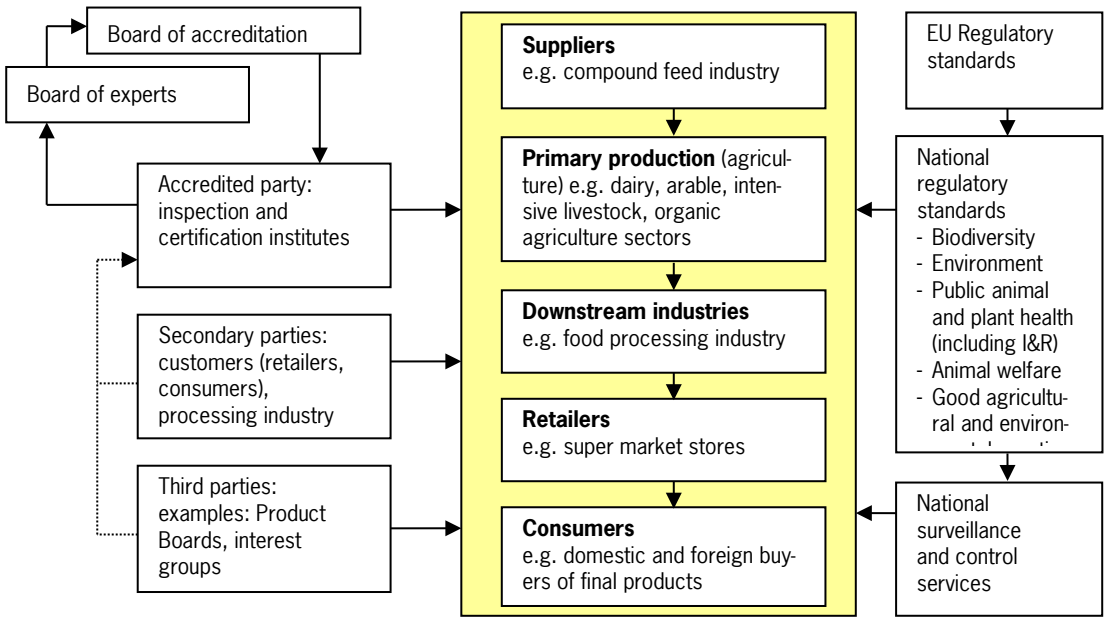
The first *standards* for agricultural commodities arose in the 1940s for organic agriculture. These standards were systematised with the establishment of the International Federation of Organic Agriculture Movements (IFOAM) in 1972. The IFOAM served as a mechanism for communication among what were then many separate initiatives. Since then, many other standards have emerged, following diverse pathways. Some standards have emerged as a response to a series of crises around food widely publicised in the media in the late 1990s and early 2000s, with consumers and governments placing pressure on retailers and food manufacturers to make their suppliers liable for the safety of their products, notably through the development of standards for good agricultural practices (GAP). Among the most well-known GAP certifications are the USDA GAP certification and EUREGAP or Global GAP certification organisation, good manufacturing practices, social and environmental impacts (Chan and Pound, 2009), demonstrating this through traceability schemes and a requirement that suppliers are certified (Amekawa, 2009).

Commodity-based 'roundtables' emerged in the mid-2000s with a slightly different approach to standards development. Previously, standards systems had focused on sectors (e.g. fisheries, forests, agriculture) or on issues (e.g. child and slave labour and the economic viability of small-scale producers). These new roundtables, however, represented a strategy by NGOs such as WWF, in particular to develop standards based upon ethical premises, and potential certification systems, for specific commodities that had the most impact on the environment. Commodity roundtables were initiated for palm oil - the Roundtable on Sustainable Palm Oil RSPO) (2004), the Round Table on Responsible Soy Association (2006) (RESOLVE, 2012), the Better Sugarcane Initiative (2007), the Roundtable for a Sustainable Cocoa Economy (RSCE) in 2007 and the ICO Round Table On Equitable Trading And Coffee (2004). This follows an increasing global trend to use multi-stakeholder public-private and support partnerships to solve persistent environmental and social problems in the agro-food commodity chain (Bitzer, 2012; van Dijk, 2012; Vermeulen and Kok, 2012). Although it has been questioned how effective these partnerships are, given insufficient comparable and meaningful data available to draw definitive conclusions and relationships and it is too early to recognise the impacts of certifications and schemes that are in the development stage, such partnership appear to contribute to produce positive economic, environmental and social impacts (WWF, 2010).

Other standards have emerged focusing on *climate*, and specifically on *carbon.* For example, two types of carbon offset markets have emerged. In the larger, compliance market, companies, governments, or other entities buy carbon offsets to comply with caps on the total amount of carbon dioxide they are allowed to emit. This market has been established to comply with the Kyoto Protocol and liable entities under the EU Emission Trading Scheme. In the much smaller, voluntary market, individuals, companies, or governments can purchase carbon offsets to mitigate their own greenhouse gas emissions. For example, projects that reduce agricultural greenhouse gas emissions and improve water quality by reducing fertiliser usage (Johnson, 2008). The Gold Standard is currently the only independent standard and label globally for emission reductions projects under the Clean Development Mechanism (CDM), Joint Implementation and Voluntary Carbon Market. It aims to ensure that carbon credits are real and verifiable and make measurable contributions to sustainable development. It allows carbon credits generated by new and existing initiatives to be bought and traded by countries that have a binding legal commitment according to the Kyoto Protocol. The Voluntary Carbon Standard (VCS 2007) is a voluntary carbon offset programme launched in 2007 by the Climate Group, the International Emissions Trading Association, the World Economic Forum, Global Greenhouse Register and the World Business Council for Sustainable Development. It includes guidelines for the development of projects in the agriculture, forestry and other land use sectors. As of November 2010, there were 489 projects registered under the VCS. The VCS is based on ISO 14064 Parts 2 and 3, and ISO 14065. The VCS also adopts CDM approved methodologies.

Distinctions can be made between public and private standards, between market and non-market standards, and between mandatory (i.e. regulation) standards and standards which are voluntarily adhered to by private sector and/or public sector organisations and actors. Figure 2.1 (YEAR in parenthesis) provides an overview of the private and public-private certification schemes (on the left), the certifiable parties in the supply chain (centre) and regulatory standards (on the right).

Figure 2.1 **Supply chain, certification schemes and regulatory standards**



Source: (Jongeneel and Herzfeld, 2012).

The terms 'private standards' and 'voluntary standards' are frequently used interchangeably. However, it is possible for governments to promulgate standards with which compliance is voluntary, thereby making compliance mandatory. For example, in implementing European Union (EU) directives to make public

procurement more sustainable, many European governments have specified procurement policies for products to demonstrate adherence to sustainability criteria, with certification schemes as a way of demonstrating this (Fox et al., 2002; Ton and Mendoza, 2007). Contracting authorities may require that works, supplies or services bear labels attributed by specific certification schemes (e.g. eco labels), provided that they also accept equivalent labels. The position of a particular standard within the grid in Figure 2.2 may change over time. Standards can be found at all levels, from individual company, to sector, nationally, regionally and internationally.

Figure 1.2 Typology of standards

Mandatory Regulations Legally-mandated private standards	**Voluntary**		**Level** International Regional national Industry Sector Company
	Public voluntary standards	Private standards	
	Non-market public standards *e.g. ILO core labour standards*	Non-market private standards *e.g. ISO*	
	Market-based public standard setting *e.g. Codex Alimenatarius commission*	Market-based private standards *eg Fairtrade, Global GAP*	

Sources (Hagen and Alvarez, 2011) (Henson and Humphrey, 2009).

Following Jongeneel and Herzfeld (2012), certification is defined as the (voluntary) assessment and approval by an accredited party on an accredited standard. While the terms 'standard' and 'scheme' are sometimes used interchangeably, the distinction is important. An overview is provided in Figure A1.1.

Private food standard (PFS) schemes comprise a standard and the governance structures and organisations involved in certification and enforcement. They range from individual company to collective schemes on a national and international level. Henson and Humphrey (2009) note that five functions are involved in standard certification schemes: standard setting, adoption, implementation, conformity assessment and enforcement. These functions may be also carried out by public or private (companies, civil society and non-for profit) entities or a mix thereof, such as the Marine Stewardship Council (MSC). There are many private standards for agro-foods, both on an individual firm and a collective (trade association). A number are shown in Table 2.1, which can be distinguished by differing objectives and scope, the customers they target, the type of chains, companies and consumers they may apply to, and the type of organisations that own and require them. Other standards, for example, aim at food safety through the adoption of good agricultural practices and the traceability. Environmental standards embrace various operational objectives (e.g. development of organic agriculture, preserving the natural habitat of birds, protecting rainforests, and limiting the environmental by GMOs contamination) and are primarily concerned with the environmental impacts of food production from farm to retailer. Social standards aim to ensure, for example, respect for labour rights and worker health and safety, reducing child labour, promoting social equity and fair-trade, and/or preserving the rights of indigenous communities also along the chain, but primarily during the production phase. Social-cultural standards such as Geographical Indication aim to preserve traditional local know-how in food production. Religious standards such as kosher and halal, focus on the mode of preparation of food as operational objectives. Other ethical standards focus on human and animal welfare.

The rise in PFS schemes is seen to have precipitated a shift in responsibility from what used to be the domain of the public sector to third-party certifiers and the stakeholder organisations involved in certification schemes (which generally do not include the public sector, but include the private sector, NGOs and producers). Food regulations are based on domestic law and practice. However, they also operate within an international framework of rules and agreements. In the past this institutional framework has often been underdeveloped and poorly enforced (GFSI, 2011). In the last twenty years these multilateral rules have become much more stringent concerning the development and use of standards. Standards and certifica-

tion have been a response to these developments and have reconfigured social, political, and economic relations in contemporary agri-food systems. It reflects the growing power of these non-state actors, especially retailers and NGOs, to regulate the global agri-food systems, but also has created opportunities to create alternative practices that are more socially and environmentally sustainable (Hatanaka et al., 2005; Marx, 2010).

In contrast to private standards, *public standards schemes* are those framed by a regulatory system and occurring on a national and/or regional level, such as the European Union and voluntary in nature. They are often based on mandatory regulations specifying food hygiene, production standards such as pesticides, fertiliser and production emission limits and food and packaging labelling voluntary labels and standards. Examples are the EU Ecolabel, which identifies products and services with reduced environmental impact in their life cycle and are voluntary labels, supported by regulation and often combined or building upon mandatory regulations (EC, 2010). Geographical Origin is underpinned with regulatory standards setting out provisions on agricultural products and foodstuffs from a defined geographical area (EC, 2006). If there is a link between the characteristics of certain products and their geographical origin, they may qualify for a protected geographical indication (PGI) or a protected designation of origin (PDO). The use of corresponding EU symbols on product labels aims to provide consumers with information on their origin and benefit rural economies by boosting farmers' income and maintaining populations in less favoured or remote areas. EU organic directives (EC, 2007) set strict standards for organic foodstuff production with an accompanying organic logo and labelling system to show that products are produced in line with the EU organic farming regulation, or for imported goods, an equivalent or identical strict set of rules. Good agricultural practices (termed good farming practice) are inherent in the organic directive and explicitly recommended as codes in other regulatory mechanisms, such as the nitrate directive and rural development policy, as ways of achieving compliance with emissions standards. Codes of good farming practice (GFP) constitute minimum standards for farm management and may serve as a precondition for payments to farmers in the context of market policy and the EU's rural development policy (Bergschmidt et al., 2003).

An overview of the main elements of standards which use GAP is provided in Table 2.1. This table highlights the diversity of objectives, the different stakeholders who drive the initiation of standards, the governance structure, including standard-setting and monitoring. The various standards cover a wide range of commodities, although there is a focus on tropical and consumer cash crop products. The focus of the standards on target producer groups differs widely, depending on the peculiar socio-economic contexts in which these crops are grown, and encompasses small to large-scale farmers, from small holdings to plantations. Among the studied standards, two are initiated by social movements (and taken up by NGOs), while two are initiated by the private sector. 4C Association has a mixed start, initiated by both industry and government.

Table 2.1	Overview of selected standards				
Standard	**Fair Trade (FLO)**	**UTZ Certified 'Good Inside'**	**4C Association**	**Organic**	**GlobalGAP**
Main objective	Improve position of farmers in trade with a guaranteed minimum price as main attribute. Focus on development/ poverty alleviation	Achieve sustainable supply chains, meeting needs of farmers, industry and consumers	Baseline standard to improve situation for producers, workers, rural communities, trade and industry, consumers and the environment	Develop standards for organic agriculture and facilitate its adoption. Unite the organic movement worldwide	Food safety issues, improving natural resources use and working conditions, creating new market opportunities
Start launch	1988	1997	2004/2007	1972	1997
Initiator	Social movement/NGO	Firm (Ahold Coffee company) in cooperation with Guatemalan coffee supplier	Government/industry	Social movement/NGO	European retail associations
Commodities	18 different product categories, including coffee	Coffee, cocoa, palm oil and tea	Coffee	Wide range of agricultural commodities, including coffee, dairy, potatoes	Fruits and vegetables, Combinable crops, coffee, tea, dairy, pigs, poultry, cattle and sheep, turkey, aquaculture
Target Group	Small farmers organised in cooperatives	Big and medium-sized estates	Coffee producers of all sizes	Coffee producers of all sizes	Producers and Suppliers
Governance structure	FLO is umbrella organisation whose membership consists of fairtrade producer networks and 20 labelling initiatives (eg, Fairtrade Foundation). FLO Board of Directors represents different stakeholders and regions and is elected by General Assembly which is open to all members	Not for profit organisation governed by Board of Directors	Governed by the General Assembly made up of all Members (producer's chamber, a trade and industry chamber and a civil society chamber). In addition, there is a Council, Executive Board, Technical Committee, Secretariat and Mediation Board. Each are represented by the various association members.	International umbrella organisation (IFOAM) sets international standards and accredits national certification bodies, who define national standards which are aligned to IFOAM basic standards.	Governed by Board of Directors. The standard receives rigorous review and undergoes improvements on a 3 to 4 year cycle to ensure the most up-to-date market developments

Table 2.1	Overview of selected standards				
Standard	**Fair Trade (FLO)**	**UTZ Certified 'Good Inside'**	**4C Association**	**Organic**	**GlobalGAP**
Who sets the standard?	Fairtrade Labelling Organisations International (FLO) Standards Committee, in which stakeholders from FLO's member organisations, producer organisations, traders and external experts participate.	Utz Certified. Standard reviewed every year by producers, agronomists and certifiers.	ISO/IEC Guides. Standards are continuously improved.	The International Federation of Organic Agriculture Movements (IFOAM) defines basic standards. For international recognition, national/regional certification bodies need to align their standards with the IFOAM basic standard.	Sector Committees are responsible for technical decision-making on elements of the standards that are relevant to their sector. Public consultation as part of standard setting process
Who monitors/audits?	FLO-CERT GMBH, an independent international certification company responsible for inspecting and certifying producer organisations and traders.	UTZ approved independent certification bodies (mix of local and international organisations)	Independent third-party companies that are accredited against ISO/Guide 65 or the equivalent	Mix of public and private inspecting organisations	About 150 third-party accreditation bodies.
Are GAP used?	yes	yes	yes	yes	yes
Environmental issues	Adhere to standards on reducing agrochemical use, reduction/composting of waste, maintaining soil health, reducing water use and contamination, prevention of fires and avoidance of GMOs. No specific guidance to Energy Conservation	Minimise soil erosion, minimise use of agrochemicals, integrated pest management, minimise water and energy usage, reduce contamination of water resources, no deforestation of primary forest, use of native species, protection of endangered species	Elements of Soil, Biodiversity Water, Energy and Air conservation are addressed but require stronger rigorous details and guidance	Standards banning use of synthetic herbicides, fungicides, pesticides, and chemically treated plants. Minimal use of synthetic fertilisers only as part of integrated system. Restrictions on land clearing/soil management. Requirements to preserve local ecosystems including setting aside conservation areas. Water conservation is addressed via irrigation management strategy only and requires improvement	Soil, Biodiversity Water conservation; Integrated waste and crop by-product management are well addressed, Energy and Air conservation are less rigorous in its details and guidance

Table 2.1	Overview of selected standards				
Standard	**Fair Trade (FLO)**	**UTZ Certified 'Good Inside'**	**4C Association**	**Organic**	**GlobalGAP**
What climate related actions?	Strict environmental standards, climate change workshops, training funding, Fairtrade Premiums are invested carbon projects on farm level. Stronger focus in FairTrade Africa.	Translating environmental standards into adaptation and mitigation measures, developing carbon footprint measures.	Capacity building on climate change adaptation and mitigation. Facilitated access to climate data. Early warning systems for extreme weather events are supported and facilitated. Targeting greenhouse gases stored in the coffee ecosystem are kept at the same level or increased. On-farm emissions are minimised.	None specifically	None specifically
Further info	www.fairtrade.net www.fairclimatedeal.net	www.utzcertified.opg	www.4c-coffeeassociation.org	www.ifoam.org	www.globalgap.org

Sources: based on Manning et al. (2012), Liu (2009), Chan and Pound (2009), SAI (2009); FairTrade (2013a).

3 Good agricultural practices and standards

The United Nations Food and Agriculture Organisation (FAO) first presented 'General principles for Good Agricultural Practices' to the FAO Committee on Agriculture in 2003 in the paper 'Development of a Framework for Good Agricultural Practices'(FAO, 2003). The annex of which broadly outlines farm-level GAP recommendations in the areas of:

- Soil
- Water
- Crop and fodder production
- Crop protection
- Animal production
- Animal welfare
- Energy and waste management
- Human welfare, health and safety
- Wildlife and landscape
- Farm business management
- Animal health and welfare

The FAO's approach to GAP is non-prescriptive and does not define a rigid set of principles but provides a technical reference for concerned stakeholders to assess existing GAP schemes and, using best expertise available, develop locally-appropriate GAP programmes. It believes that Good Agricultural Practices can be a tool for deciding, at each step in the production process, on practices and/or outcomes that are environmentally sustainable and socially acceptable, contributing to Sustainable Agriculture and Rural Development. The FAO believes that these local-level good agricultural practices can draw inspiration from texts already existing in international regulatory frameworks such as the International Plant Protection Convention, Codex Alimentarius Commission, World Organisation for Animal Health and from broader GAP principles promoting environmental, economic and social sustainability. As such the FAO acts as a resource, providing key documents such as technical cases studies, training materials and a database.

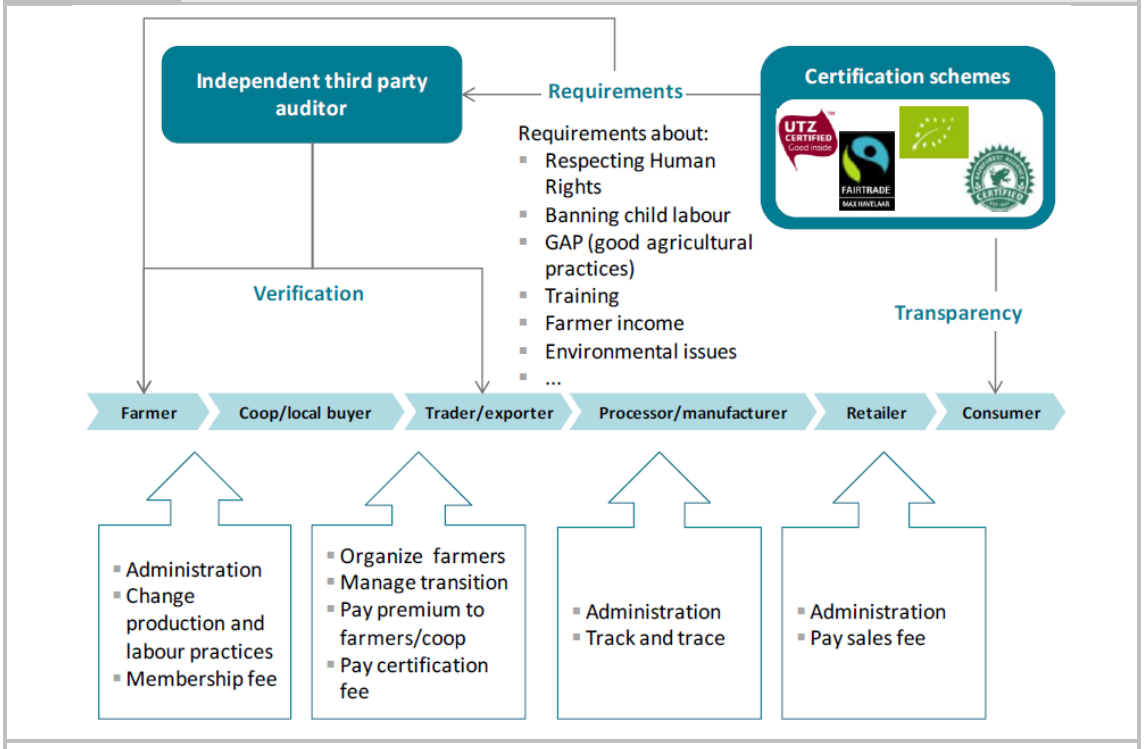
The FAO is also active in designing climate sensitive good agricultural practices both in response to climate induced disasters (Roberts and Shears, 2008) and as part of their analysis of the key technical, institutional, policy and financial responses required to achieve a transformation to climate-smart agriculture (FAO, 2010). A key finding of this review is that effective climate-smart practices do already exist and could be implemented in developing country agricultural systems. Although the FAO continually updates its website dedicated to climate-smart practices, at the moment these two streams of thought (GAP and CSA) are largely separate. For example, the FAO does not talk about climate change or climate-smart practices in its main webpage on GAP (FAO, 2008). Equally, in the FAO's climate-smart agriculture report (FAO, 2010), GAP that are climate smart are not mentioned. However, the FAO itself also states as a key finding that greater consistency between agriculture, food security and climate change policy-making must be achieved at national, regional and international levels.

Different organisations offer more prescriptive, GAP-based certifications (see Figure 3.1). Among the most well-known are the USDA GAP certification and GlobalGAP, the latter which has emerged as the most prestigious food quality assurance system at the field level (Amekawa, 2009) and is a business to business (B2B) based scheme. A third type of GAP based certification is UTZ Certified, which, unlike GlobalGAP, is business to consumer (B2C) focused. Generally, farmers must first implement GAPs in their production processes. Then they must hire a certifier to audit and inspect their production processes and documentation. While GAP certification is voluntary, many large retail chains like Wal-Mart and Royal Ahold require that their suppliers are GAP certified by third-party certifiers. Third-party certifiers are by definition independent of other members of the food production chain, whereas first-party certifiers are the producers themselves and second-party certifiers are the retailers. Third-party certifiers are thought to be more

reliable and objective because they have no vested interest in the outcome of the audit, however this has been questioned (Hatanaka et al., 2005).

Figure 3.1 provides a schematic overview of processes related to certification, where GAPs are among the requirements set by certification schemes, to be complied with by farmers and subject to audit by external parties.

Figure 3.1 **Schematic overview of processes related to certification (cocoa example)**



Source: KPMG (2012b).

The United States Department of Agriculture Agricultural Marketing Services Division provides independent audits based on an GAP & GHP (Good Handling Practices) Audit Verification Checklist, of produce suppliers throughout the food production and supply chain to verify adherence to the recommendations outlined in the Food and Drug Administration's Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables. An online tool aims to make it easier for farmers to become GAP certified. The tool is part of FamilyFarmed.org's On-Farm Food Safety Project and helps farmers design a customised manual to meet GAP standards and certification requirements by answering a few questions. Once the farmers have completed their farm's food safety plan and compiled the necessary documentation, they are eligible to apply for GAP certification.

GlobalGAP, formerly known as EUREGAP, is a private sector not-for-profit organisation that sets its own voluntary standards for the certification of agricultural products worldwide. In the late 1990s, the Euro-Retailers Produce Working Group (EUREP), a consortium of major European retailers, developed EurepGAP - pioneering food safety codes of conduct regarding consumer food safety, hygiene, labour conditions, animal welfare, as well as environmental management on the farmland. The standard protocol initially focused on fresh fruit and vegetables and later included other crops, aquaculture, and livestock (Amekawa, 2009). GlobalGAP has grown to worldwide not-for profit voluntary standard organisation that aims to assure good agricultural practice through certification of agricultural products. A GlobalGAP label is not directly visible to consumers because it is a business-to-business label that covers farming activities before the product leaves the farm. Certification is carried out by independent and accredited certification bodies around the world. Its objective is safe, sustainable agricultural production worldwide, with a mission is to globally connect farmers and brand owners in the production and marketing of safe food to achieve a uni-

versal standard; safe and sustainable food for everyone everywhere today and in the future; Safe production methods; Responsible use of resources; Welfare of workers and animals; Protection of scarce resources; Easier certification and wider markets for producers; Reliable sourcing and processing for retailers and reassurance for consumers.

GlobalGAP uses a network of members to achieve its goals and spread its mission. To date, there are 196 agricultural producer and supplier members from across Africa, Asia, South and North America, Europe, Oceania and the middle East (GLobalGAP, 2013a). Producer and supplier members demonstrate their commitment to fully comply with the GlobalGAP Standard and hereby act as industry leaders in GAP with members they are entitled to use the GLOBALG.A.P. logo and represent their producer interests in the GlobalGAP governance structure. In this position they may act as a driver for innovation in their market and profit from first mover advantages. There are 48 retail and food service members, predominantly in Europe and North America. Retail and food service members demonstrate that their policy is in line with GlobalGAP. Membership enables them to use the GLOBALG.A.P. brand in their corporate communication strategy, and gives them the opportunity to be part of the standard setting process. Retail members are granted preferential access to the GlobalGAP Database which assists them in providing the necessary assurance to their consumer base. There are 131 associate members, again many from Europe and North America, who play an integral part in the GlobalGAP network by contributing to the National Technical Working Groups and other stakeholder consultation processes. In this way associate members have a significant influence on the GlobalGAP standard setting process, without being directly involved in decision making.

The rapid growth of GlobalGAP has stimulated the development of codes of good agricultural practice that have subsequently been formally recognised as equivalent in a number of countries. A formal benchmarking process has been established for this purpose, whereby an approved independent body undertakes an assessment process. To date, 13 national GAP schemes have been formally recognised as GlobalGAP equivalent, a number of which in developing countries: ThaiGAP, ChinaGAP, IndiaGAP, MexicoG.A.P., ChileGAP, KenyaGAP, a regional AseanGAP (see (GlobalGAP, 2013b). In Malaysia, quality assurance programmes for primary producers with a number of voluntary farm certification schemes including the fresh fruit and vegetable sector certification (SALM). The roles of businesses in setting up these schemes has been strong. An increasing tendency for the involvement of other actors in GAP is apparent, for example donors in Kenya engaged with GlobalGAP and benchmarked to it in establishing national standards (Liu 2009). The substantive elements of the GAP standards-setting process currently operating were based on the FAO GAP Principles (Kontogeorgos, 2010), and are as follows (GlobalGAP, 2008):

- The decision to proceed with work on a new or revised standard is taken by a Board of Directors, consisting of elected members with equal numbers from the food retail sector and production/supply sectors. Decisions are by consensus. The terms of reference are then drafted and posted on the GlobalGAP website, and stakeholders invited to comments.
- GlobalGAP Sector Committees are responsible for technical decision-making on elements of the standards that are relevant to their sector. The members of the Sector Committees are elected, with a balance between food retail and producer/supplier sector representatives. In practice, however, the Secretariat plays a key role in directing the establishment and revision of GlobalGAP standards.
- At two stages in the standards-setting process, draft standards are published on the GlobalGAP website for a period of 60 days and comments invited from stakeholders. These comments are compiled by the Secretariat and fed into the relevant Sector Committees.
- New or revised standards are first agreed by the relevant Sector Committee, by consensus where possible or a simple majority vote. The elected Board of Directors is responsible for final approval of the standard.
- Beyond the two periods of stakeholder consultation undertaken as part of the standards-setting process, formal institutions have been established to facilitate and coordinate relations between GlobalGAP and stakeholders. For example:
- A Certification Body Committee, consisting of representatives of approved certification bodies, aims to provide feedback on implementation issues and enables certifiers to have a 'voice'.

National Technical Working Groups, established voluntarily by GlobalGAP members, provide clarification on the implementation of standards on a local scale. The guidelines developed by these working groups are approved by the relevant Sector Committee and published on the GlobalGAP website. National Technical Working Groups also provide substantive input during the formal standard-setting process.

UTZ Certified started in 2003 and is a private, not-for profit sustainability program for coffee, cocoa and tea that works together with existing brands. It started with a coffee farmer and processor partnership and has become one of the world's fast growing commodity-based GAP-certification programmes for commodities including tea, coffee, cocoa and provides traceability services for soy, oil palm and cotton. Farmers are enabled to improve their productivity, product quality and efficiency with care for people and environment. This allows them to produce higher volumes at lower costs which raises the standard of living of the farming communities. With an UTZ Certified certificate cocoa producers can demonstrate good agricultural practices, efficient farm management and responsible production of their cocoa. For cocoa traders and processors the UTZ Certified certificate is an assurance of responsible cocoa production which they can use in their sourcing decisions. The criteria of the UTZ Certified Code of Conduct are based upon GAP and ILO conventions as internationally recognised criteria for economic, social and environmental responsible production. Producers are UTZ Certified when independents certifiers - trained and accredited by UTZ Certified - determine that the farmers are in compliance with the requirements of the UTZ Certified Code. This inspection is repeated annually. UTZ Certified develops a Code of Conduct - including GAP - for each commodity and in this way addresses the main challenges in the sector. Through the product-specific requirements farmers are able to improve their agricultural practices which is predicted (Chan and Pound, 2009; Nelson et al., 2009), and for products such as coffee and tea in some countries, proved to contribute to improvements in productivity and quality, whilst respecting and protect people and environment (Braga et al., 2010; GBCG, 2012; Kamau et al., 2011; UTZ, 2011). As per January 2010 the UTZ Certified Code of Development Procedure' complied with the ISEAL Alliance Code of Good Practice for Setting Social and Environmental Standards. The ISEAL Alliance is an international non-profit organisation that codifies best practice for the design and implementation of social and environmental standards systems. ISEAL Alliance members are leading organisations in social and environmental standard setting and certification, and are committed to compliance with ISEAL Codes of Good Practice. The Code development procedure sets the requirements for new UTZ Certified Codes of Conduct as well as the reviews and revisions of existing Codes. An example of how GAP is embraced in the UTZ code is shown in Box 3.1.

Box 3.1 GAP in the UTZ Certified Code of Conduct for coffee

The UTZ CERTIFIED Good Inside Code of Conduct version 2010 is equivalent to the requirements of the EurepGAP Control Points and Compliance Criteria (version 1) Coffee standard and GlobalGAP (version 3) General Regulations and Control Points and Compliance Criteria. The UTZ Code addresses:

- responsible use of registered fertilisers and pesticides
- record-keeping of fertilisers & agro-chemicals
- protection of labour rights
- worker health and safety
- access to healthcare and education for workers and their families
- protection of natural flora and fauna
- monitoring business processes
- good housekeeping practices
- workers trained
- implementation of accident and emergency procedures
- implementation of hygiene rules and practices
- traceability of coffee
- annual internal inspections

Mandatory and additional control points to check compliance with GAP and GFP at producer level are specified over a period of four years. For example, GAP to meet the soil fertility objectives and to prevent soil erosion include controls on the use of shade trees, compost, cover crops, nitrogen fixing plants and mulching. These practices should lead to appropriate quantities of organic matter and healthy biological activity. Other examples are cross-line planting on slopes, drains, sowing grass, trees and bushes on borders of sites and mulching. The standard specifies that the type and amount of fertilisers and inputs applied should be appropriate for the situation, the choice of fertilisers and chemicals used by the producer, their storage and application, that their use should be recorded and specifies which crop protection substances are banned and may not be used. The choice and use of fertilisers can demonstrated by official qualifications, attendance certificates and/or training courses and demonstrations in practice. Compliance with standards for storage is visible.

Source: UTZ Certified Code of Conduct for coffee.

General challenges related to GAP are that in some cases GAP implementation, particularly record keeping and certification, increases production costs (Anne Tallontire, 2012; KPMG, 2012a; Nelson et al., 2009). This can lead to an inhibition or disincentive to continue with GAP and/or certification, particularly if these costs are largely borne by (poor) farmers in developing countries. The proliference of GAP-related schemes and certification systems has also led to confusion and increased certification costs for farmers and those involved in the schemes.

GAP and standards of GAP serve competing interests of specific stakeholders in agri-food supply chains and modifying supplier-buyer relations, creating challenges for their implementation (RESOLVE Inc., 2012). Awareness of 'win-win' practices, such as Integrated Production and Pest Management (IPPM), which lead to both improvements in yields and production efficiencies as well as environment and health and safety of workers can be lacking on a farmer and sector and standard body level, and is a is dynamic area, with on-going updates on the results of such proven practices necessary. However, as the FAO (FAO, 2008) and various commentators have noted, compliance with GAP standards does not always foster all the environmental and social benefits which are claimed (Blackman and Rivera, 2010; RESOLVE Inc., 2012). The evidence base to support these claims is now slowly being developed, but remains patchy and often unsubstantiated.

This section emphasises that standards tend to focus on the environmental and /or social impacts of agricultural practices, but take many different forms and perspectives, targeting and implicating different stakeholders on a range of, often overlapping levels from local to global. Many standards define what is 'good' and by specifying which practices are permitted, but also recommending and encouraging certain best farming practices with positive environmental and social outcomes. They use diverse systems of branding, certification, audits, chain of custody and control, auditing and reporting to maintain these standards.

4 Roles of stakeholders in agri-food standards and GAP

The myriad of agrifood certification schemes that use GAP have brought together a wide range of organisations of many types: farmers and producers, business in the agro-food value chains, researchers, sustainability and social advocates and lobbyists, civil society and non-government organisations, and governments. A multi-stakeholder approach to developing and implementing standards has created space for cooperation but also strongly depends on the level of collaboration and negotiations, for example, to agree feasible standards for improved production practices (RESOLVE, 2012). Many of these organisations also play more diffuse roles in developing, shaping, monitoring, and working with standards and certification systems, in accordance with their particular capacities, goals, and theories of change. The following section provides a summary of the roles played by the main actors in agro-food standards that are based on GAP.

Standard-setting organisations

Standard-setting organisations create and adopt standards on different levels and include public and private sector organisations. These organisations can be engaged by policymakers. Global standards setting bodies include the International Organisation for Standardisation (ISO). ISO is a hybrid body composed of public and private national standard setting bodies that is an international NGO that develops standards across a wide range of areas and sectors, from product specifications through to management systems. The technical work of ISO is decentralised, carried out through a hierarchy of technical committees, subcommittees and working groups. Participants in these committees include representatives from industry, research institutes, government authorities, consumer bodies and international organisations. The ISO has reviewed how ISO standards can help towards addressing climate change (ISO, 2010). The report does not discuss specific agricultural practices but sees a way forward to supplement professional and personnel standards, for example, ISO 14066, with additional competency requirements for practitioners in for example, the agriculture sector, and to incorporate GHG accounting in product level and supply chains.

The Codex Alimentarius Commission is another global standards organisation, established in 1963 to develop food standards, guidelines and related texts as part of the Joint FAO/WHO Food Standards Programme. It now sets standards on food quality and safety, including food commodity standards and codes of hygienic or technological practice. It also evaluates pesticides, food additives and veterinary drugs and establishes limits for pesticide residues and guidelines for contaminants. Codex has a highly structured process for standards-setting (CAC, 2007). The Pesticide Initiative Programme, for example, 'attempted to engage with the main standard-setting bodies' to ensure they were aware of problems with certification and inappropriate criteria. By creating possibilities of stakeholders to get engaged, governments can play a more profound role in the transparency of standard-setting process (Webb 2010). Since the executive power of any given standards body is ultimately the responsibility of its board of directors (or its general assembly), the principle of multi-stakeholder representation is an important issue (Sexsmith and Potts, 2009). Other standard-setting associations include international groups of NGOs such as the Fairtrade Labelling Organization International (FLO) and the Sustainable Agriculture Network (SAN). This is a coalition of independent non-profit conservation organisations that promote the social and environmental sustainability of agricultural activities by developing standards. Certification Bodies certify farms or group administrators that comply with SAN's standards and policies. Certified farms or group administrators can apply for use of the Rainforest Alliance Certified trademark for products grown on such certified farms. From 1992 to 2011, over 700 certificates for more than 130,000 farms, including small family farms of cooperatives, as well as plantations in 29 countries, had been issued.

On a national level, an example is the Ethical Trading Initiative (ETI), a tripartite standard setting organisation with government, businesses and trade union representation in the United Kingdom. On a sectoral level, an example is the ISEAL Alliance, an international non-profit organisation that codifies best practice for the design and implementation of social and environmental standards systems. ISEAL Alliance members are social and environmental standard setting and certification bodies, committed to compliance with

ISEAL Codes of Good Practice. ISEAL and its members define what good practice is for the sector and by influencing how external stakeholders consider and engage with credible standards systems. ISEAL works from the premise that voluntary standards systems that are effective and accessible can bring about significant positive social, environmental and economic impacts. The continuing strong growth in the size and scope of voluntary standards systems is an indication of the influential role that these systems can play in bringing about positive change on a global scale. However, it also highlights the pressing need for a broadly shared understanding of good operating practices for the movement as a whole. Since 2004, ISEAL has been facilitating international consultations to determine what good practice should look like for voluntary standards systems. This aims to develop and maintain an evolving suite of credibility tools that support the effective implementation of voluntary standards systems. Various Codes of Good Practice each contribute to that goal, such as Codes of Good Practice focused on standard-setting procedures, measuring impacts of standards systems and verification practices.

Research and universities

There are many universities and research organisations that offer GAP, especially those that work in conjunction with local extension services in developed and developing countries. For instance, these organisations provide training and advice on GAP and may assess how well a farm's current production practices meet GAP standards and government standards (for example, the US Food and Drug Administration). For example, in the US, the University of California, Davis, the University of Maryland and Family Farmed offer guidance and a format to create a Food Safety Plan. The Joint Institute for Food Safety and Applied Nutrition (JIFSAN) in the USA, a multidisciplinary research and education program jointly administered by the FDA and UM, published 'Improving the Safety and Quality of Fresh Fruit and Vegetables: A Training Manual for Trainers' and the JIFSAN Good Aquacultural Practices Manual.

NGOs, consumer and worker representatives

NGOs, consumer and worker representatives play an array of roles in standards. Foundations and civil society organisations have in the past taken the lead into the formation of multi-stakeholder standards and certification systems (which themselves were often established as NGOs) leading market campaigns to engage consumers and create pressure for certification (RESOLVE, 2012). Examples of such civil society organisations include environmentalist groups, faith-based associations, trade unions, animal rights movements and other organisations involved in social progress. Their ultimate objective has been to promote and reward sustainable or ethical business practices. Standard-setting NGOs may themselves be umbrella organisations of smaller NGOs, each with their own constituencies. By mobilising coalitions of producers, manufacturers, retailers, scientists, and sustainability advocates, NGOs and foundations have helped to create space for collaboration and negotiations that seek agreement on feasible standards for improved production practices. These organisations have roles in developing, monitoring, and working with standards and certification systems. When these goals diverge, NGOs often realign their activities around other strategies (RESOLVE, 2012). Examples of roles played by NGOs in the past include improving the performance of standards and certification systems, training producer and companies on standards (for example, Solidaridad collaborating with UTZ to train cocoa farmers in West Africa), helping to ensure the robustness of certification audits and raise the quality of the standards. They are involved in creating, developing, implementing (often via training and capacity building, engaging with consumers, catalysing demand for standards, engaging with industry and putting pressure on companies (RESOLVE, 2012).

Businesses

Businesses such as producers, retailers, wholesalers and exporters are involved in the creation, proliferation, implementation and licensing of standards. Companies often seek to gain competitive advantage through using certification. Businesses play other roles when they develop their own standards. Business are key players in scaling up standards and certification systems. They are in an influential position driving innovation and continuous improvement. Companies are interested in efficiencies, and have used this posi-

tion of influence to encourage efficiency gains through greater cooperation and harmonisation between standards systems (RESOLVE Inc., 2012). Exporters are in a good position to finance and maintain compliance systems, and have considerable vested interest. For example, by working through exporters, programs have reached many of the players in the supply-chain: smallholder outgrowers, farm workers, drivers, pack house workers, etc. (Webb 2010: 3). The importance of exporters as gatekeepers to external markets and key actors in developing countries has been emphasised by Gibbon (2009) and by Henson et al. (2009). Businesses in the form of auditing companies are also involved in auditing and verifying if standards are met, who may verify at individual farmer, producer organisation and corporate level.

Small-scale farmers and producers

Small-scale farmers and producers are major actors involved in the implementation and revision of standards. The main 'trigger' for farmers to adopt and implement GAP, has been through private sector and supply chain demand for the 'assurance' (certification) that drives the implementation and acceptance of GAP-based schemes. This is because consumers and business to business buyers require assurances that farmers comply and deliver. Farmers and their organisations (cooperatives, associations, enterprises) have and do also use standards to secure access to markets. As a general rule, direct representation of producers in developing countries is most significant among standards organisations that formally institutionalise positions for these stakeholders. For example, Sustainable Agriculture Standard Committee of consists of 58 seats who represent a broad range of perspectives from across all areas of agriculture, including commodity producers; specialty crop producers; agricultural product processors and distributors; food retailers; environmental, labour, and development organisations; NGOs; industry trade associations; government representatives; academics; regulators and certifiers (SAS, 2013). Standards that do not have a formal structure specifying producer representation tend to have higher representation from upstream segments of the value chain - particularly from larger, corporate sector players. The representation of producers in developing countries in a number of standards development committees is presented in Table 4.1.

Table 4.1 Producer and developing country representation on standards development committees

Indicator	FairTrade	Sustainable Agriculture Network	UTZ Certified	Marine Stewardship Council	Forestry Stewardship Council
Producer/total members	3/7	1/12	yes	1/15	variable
Formalisation of produce positions	yes	multistakeholder	In progress	no	yes
Developing country representation/total members	3/7	7/12	yes	3/15	3
Formalisation of developing country positions	yes	yes	In progress	no	yes

Source: Sexsmith and Potts (2009).

Governments

Governments and their agencies have played a critical role not only in creating an enabling environment for certification but in providing mandatory and complementing standards through regulations, policy frameworks and other measures that set minimum acceptable performance and ensure food safety and food quality (ITC, 2011). Insights into the different roles governments play in such certification constellations include:

- *facilitating*
  providing resources to facilitate the development of a standard, enabling legislation; strategic stakeholder dialogue; awareness raising among respective industry, consumers and producers (UNCTAD, 2006); incentives, subsidies, tax rebates; procurement policies; capacity building; supporting the dissemination and uptake of labels and certificates; facilitating national stakeholder dialogue (UNCTAD,

2006) and self-governing agencies (Carey and Guttenstein, 2008; Van Tulder et al., 2004; Van Tulder and Van der Zwart, 2006). They may also facilitate linking national to international standards and organisations.

- *users*
  certifying own operations, explicitly requiring products purchased or imported to be certified to a specific standard or to be compliant with a certain standard's criteria. Governments have also become more directly engaged with certification by supporting or preferring certified products as part of government procurement programs.
- *supporting*
  encouraging suppliers to get certified to public and private standards by providing financial incentives, technical assistance and dissemination of information on new legislation in importing countries (UNCTAD, 2006).
- *endorsing*
  offering political support; publicity and praise are given to sustainability efforts, including endorsement (such as government adoption) of labelling; support for civil society initiatives and publishing of 'best practices' and providing infrastructure facilitating and measuring compliance (UNCTAD, 2006) (Carey and Guttenstein, 2008; Van Tulder et al., 2004; Van Tulder and Van der Zwart, 2006);
- *partnering*
  Governments have increasingly supported standards by using policies which combine public and private and other resources, such as through public-private partnerships, agreements and covenants. An example is IDH in the Netherlands. Governments may stimulate multi-stakeholder partnerships in the process of private-standard setting. For example, IDH has created a Forum involving various stakeholders. The IDH/STAP aims to stimulate FSC certification as the way to achieve sustainable timber imports to the Netherlands and Europe, and hence can be considered as supportive of FSC and is the main way in which the innovation to make ecosystem services explicit in timber chains is enacted. Value chain innovations in the Dutch public procurement and REDD+ cases only indirectly mention or encourage ecosystem services to be addressed (Berg and Ingram, 2012).
- *standard setting*
  Governments have been involved in standards setting for voluntary standards, especially when these have implications, for example, for food quality and for international trade and competition. An example is the discussions about timber standards in use in the Netherlands (Vermeulen and Kok, 2012). According to Lui (2009), using the example of the Africa Observer Project, supported by GlobalGAP, a German government agency: Deutsche Gesellschaft fur Technische Zusammenarbeit, and a UK government agency, Department for International Development DFID, participated in National Technical Working Groups. They also provided funding for innovative activities by public institutions such as Codex and OIE to take the leadership in developing transparent, non-discriminatory and science-based standards setting and to involve developing countries governments. Similar developments have happened in the coffee and cocoa sectors where the Dutch Sustainable Trade Initiative (IDH), a government supported initiative, has been activity involved through its Cocoa Quality Improvement program in helping setting impact standards and developing measurement and reporting mechanism for sustainable cocoa generally and in the Dutch market. Adherence to and use of standards have also grown as confidence in the capacity of the government to manage risk (for example food safety and quality) has decreased by both producers, retailers and consumers (Fulponi, 2006).
- *assessing*
  assessing the impacts of standards and if they are tools that contribute towards wider public policies, such as food quality, development or trade (McDermott et al., 2008). They may use their powers to regulate advertising and trade to keep misleading or unsupported claims about the impact of certification.
- Government agencies can and do look to certification programmes for demonstrations of potentially useful and adaptable technologies, practices, and approaches.

Given the continued proliferation of public, private and firm standards, a number of these key groups of actors have called for and supported harmonisation across standards, such as the ISEAL Alliance. This process has been supported by the development of 'meta systems' such as Good Agricultural Practice (GAP)- and similar meta-systems such as hazard analysis critical control point (HACCP) procedures, good manufacturing practice (GMP) and the International Food Standard (IFS)[1] for food safety management systems. A number of standards now incorporate these meta systems, such as the food safety management system ISO 22000 and ISO 9000 developed by the ISO, as well as those developed by individual firms (Hagen and Alvarez, 2011).

This section highlights that the processes of defining good agricultural practices in agri-food standards are complex. There are many actors shaping and defining what are 'good' agricultural practices and for whom they are good (farmers, consumers etc.). This occurs at many different levels and at different times and points in the cycle of development, implementation, use and evaluation of standards. A tendency towards 'top down' definition of standards can be seen: that is, standards are defined by certification bodies, international organisations and consultative groups including experts, with some reference to members i.e. producer groups, rather than being bottom up (from the farmer/producers). The role of the government has often been absent or indirect in standards themselves, although many elements of standards are built around mandatory national and international food quality and safety regulations. However, an increasing tendency for governments, particularly in developing countries at the consumer end of agri-food chains, to be indirectly involved, for example though partnerships and setting guideline, is apparent.

[1] In 2002 German retailers developed the IFS and were joined in 2003 by French food retailers (and wholesalers) to develop of a normative document. The IFS standard is a uniform tool to ensure food safety and monitor the quality level of producers of retailer-branded food products. The standard applies to all steps of the processing of foods subsequent to their agricultural production and allows for certification at the 'foundation level'. It is considered as the minimum requirement for the international food industry and a 'higher level' giving a superior standard.

5 Climate smartness in agro-food standards

Agricultural practices which have impacts on climate include practices which *mitigate* the effects of climate change, for example, reducing greenhouse gas (GHG) emissions from crop production and practices, deforestation to obtain agricultural land, sources of energy and their use, the contribution of livestock and manure to GHG emissions and the forms and role of carbon stocks on farms. Other practices which are *adaptive* to climate change include those practices which help farmers to increase their resilience and their capacity to respond to climate change. The majority of standards are currently not explicitly climate smart. They do not explicitly address climate (RESOLVE, 2012), nor are a focus on either mitigative or adaptive farming practices.

This section shows that there is a disconnect between good agricultural practices and climate smartness. Many standards do not address climate issues specifically or explicitly. Climate relevance and impacts are only just starting to become a consideration in standards. However, as good agricultural practices have environmental and social relevance and impacts, a number of these practices can also be used to enhance the climate smartness of schemes. One way of doing this as a first step has been to assess the climate (or carbon footprint of farming and other processing and operations) in an agrifood chain. Standards for specific commodities (RSPO for oil palm and Bonsucro for sugar) on carbon have started to do this, although this focus has not yet been translated into the agricultural practices that form the building blocks of these standards, and debates are ongoing whether GAP are the best way to be climate smart, or whether emissions target setting - leaving the agricultural practice open - is a better option. These discussions and approach to climate smartness reflect the entry point and preoccupation of different actors, mainly NGOs, private sector and large-scale growers, rather than of small scale farmers and consumers. For a handful of commodity-specific standards (UTZ and 4C for coffee), steps have been made to make climate issues more explicit, by reviewing which GAP also have climate implications. Only one broad agricultural standard, the Sustainable Agriculture Standard, has gone a step further by explicitly creating add-on modules to make their standards and agricultural practices more climate smart.

Alongside the growing number of carbon standards and projects (see section 0), some standards have started to address the climate in the last five years. This has been with a focus on greenhouse gas emissions and particularly carbon. Specific examples include the RSPO, which has started to measure and monitor GHGs in palm oil production and processing facilities using an accounting tool (Chase et al., 2012). Proposals have been made of the agricultural practices which contribute to higher levels of GHs, for example, energy and fertiliser use and water management on plantations. Discussions focused on whether prescribing preferred practices (i.e. GAP) or technologies, or setting GHG emissions targets was the preferred option for RSPO members (Brinkmann Consultancy, 2009). Bonsucro is monitoring GHG emissions and working out the carbon footprint of sugar production (BONSUCRO, 2013).

Climate-smart issues are addressed more implicitly through the environmental focus of many standards in their recommended or obligatory GAPs. The environmental aspects which also have implications for climate change include: biodiversity loss, conversion of natural ecosystems, pollution and degradation of natural resources - such as water, air and soils; and attendant issues such as degradation, erosion and/or desertification. The Sustainable Agriculture Initiative (SAI) Platform report (SAI, 2009) provides a colour-coded graphical overview of 24 evaluated certification schemes in which it assesses: Soil conservation (cultivation techniques; soil structure and fertility); Water conservation (water use/quality management; irrigation; wastewater management); Biodiversity conservation (endangered species; diversity of flora/fauna; protection; restoration); Integrated waste and crop by-product management (use of crop by-products; waste recycling); Energy conservation (renewable sources of energy; reduce air pollution; global warming; fuel usage); Air conservation (preserving/improving quality of air). Elements of integrated crop management (rotation practices, cultivation techniques, nutrient management, fertilisers, sludge, integrated pest management, agrochemicals) are also applicable for CSA practices. The selected 24 standards all

score differently on these criteria and thus call for different strategies to make climate smartness more explicit in standards.

In a study of standards used in the cocoa sector (KPMG, 2012b), the climate-smart environmental issues in Rainforest Alliance include specific requirements for farmers to maintain existing shade trees or plant new ones. Farmers need to have plans in place to reduce their carbon emissions or increase carbon sequestration and they are also required to annually describe their energy use per source and have a plan for energy efficiency. Farmers are responsible for their waste disposal and should be trained on waste management following the principles established in Rainforest Alliance guidelines. Burning of waste in open air areas is not allowed under any circumstances (KPMG, 2012b). The ability of coffee farms to produce high quality products under natural forest conditions can make coffee production particularly attractive from a carbon sequestration/climate change perspective. To the extent that certification initiatives promote shade coverage and tree diversity, they can also play an important role in maintaining global carbon sequestration capacity, and thus in mitigating the greenhouse effect. UTZ Certified also has specific environmentally focused requirements for farmers that have climate-smart implications. For example, it requires farmers to maintain existing shade trees or plant new ones. Even though farmers should have a risk assessment and environmental impact action plan, no direct recommendations are given in relation to GHG emissions, as it argues that mitigation is addressed through forest cover and other environmental aspects and the energy use is minimal. There are no specific guidelines for farmers on how to organise waste disposal systems, although at central locations, farmers should provide a designated area for waste storage and disposal. The UTZ Certified's position paper (UTZ Certified, 2012) and website (Tregurtha, 2012) affirms their commitment to focus on climate change in agricultural supply chains, with investments and partnerships at every level of the chain and to strengthen their Codes of Conduct to be more explicit on climate change such as in soil conservation, water management and protecting biodiversity (see Box 5.1).

Climate issues are addressed, for example, in Fairtrade where a recommendation on the more efficient use of energy and the replacement of non-renewable sources by renewable ones whenever possible in the processing facilities. Fairtrade will require the registration of greenhouse gas emissions savings in case initiatives are in place as of 2017. From 2014 onwards, farmers are responsible for the waste disposal. They will be required to have designated areas for hazardous waste disposal and storage, in absence of a disposal system. The burning of hazardous waste will only be allowed if this is in compliance with local legislation (KPMG, 2012b). FairTrade also launched a website that focuses on climate issues and thus manifests the intentions of FairTrade to keep climate adaptation and mitigation issues in focus (www.fairclimatedeal.net).

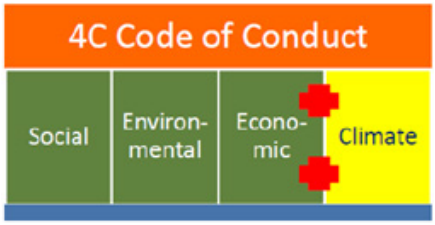
Recently climate smartness has been addressed more specifically in standards which are based upon GAP. For example, the Common Code for the Coffee Community (4C) Association is developing a standard module for the 4-C Code which supports coffee producers to adapt to climate change and chose adaptation options supporting greenhouse gas sequestration and/or reduction (climate change mitigation) (4C, 2012). This climate-module is an add-on to the existing social, environmental and economic requirements in the 4C Association Code of Conduct, shown in Box 5.2. It has been developed with a multi-stakeholder partnership, including Sangana Commodities Ltd, the German Technical Cooperation with the Common Code for the Coffee Community (4C) Association, Tchibo GmbH and the World Bank are implementing a three year Public-Private Partnership.

Box 5.1	**Climate change in the UTZ Code of Conduct**	
How climate change is addressed	**Relation to an effective response to climate change**	
	Adaptation	**Mitigation**
Soil Management	Assessing and conserving soil fertility and securing a good soil texture supports climate change adaptation by increasing the soil's resilience against changes in precipitation and temperature.	On a more aggregated level conserving and improving soil fertility, delivers the base for sustainable yields. This can ultimately reduce the pressure to expand agricultural boundaries by making new land arable. Such land use changes are releasing large amounts of greenhouse gases.
Fertiliser Use	By securing good soil texture and fertility the soil will be better prepared to cope with small temperature changes and, for example, prolonged drought periods.	Reducing the (relative or absolute) use of chemical fertilisers, emits less greenhouse gas through fertilisers production and in application. In some cases adequate fertiliser application may lead to increased amounts of chemical fertilisers applied. However, increasing productivity, emissions per unit of product will be reduced. Suitable record keeping can support the monitoring of emissions.
Integrated Pest Management & Crop Protection		Appropriate application of chemical pesticides supports climate change mitigation, if resulting in a reduction of total chemical pesticides applied. Keeping records of applied pesticide amounts, types of application, can support the monitoring of greenhouse gas emissions on the farm.
Water Management & Irrigation	Protecting water streams and bodies near agricultural production zones especially in areas where decreasing amounts of rainfall are predicted. Conserving riparian areas and avoiding water pollution through agrochemicals supports adaptation. By looking into adequate use of irrigation water, the Codes support climate change adaptation. Water availability changes throughout the year, therefore careful handling of water resources is crucial.	
Post-harvest Product Handling (coffee)	Re-using coffee by-products supports adaptation, by using mulch, which retains moisture in the soil. Furthermore, the Code asks for wastewater treatment in coffee wet processing. This contributes to climate change adaptation by minimising contamination of water streams and sources, no or less additional human induced stress on available water resources is achieved.	Re-using coffee by-products such as pulp, hull, husk and parchment as fertiliser, mulch or source of energy supports climate change mitigation, if resulting in reduced chemical fertiliser application or reduced deforestation, for example, for household cooking. Furthermore, the Code asks for wastewater treatment in coffee wet processing. This contributes to climate change mitigation as wastewater emits methane if not treated.

Natural Resources & Biodiversity	Maintaining or increasing forest cover in and around production areas provides organic matter for composting, supports water infiltration in soils and regulates local temperatures and partially rainfall patterns. Producing more than just one crop can support food security and potentially leads to the diversification of income sources, helping to hedge losses in yield quality and quantity caused by climate change.	Shading practices and reforestation mitigate climate change by removing greenhouse gases from the atmosphere and storing them in biomass. Limiting deforestation reduces emissions.
Energy Sources and Use		Looking into energy efficiency, renewable energy and record keeping contribute to climate change mitigation by reducing emissions and providing data for monitoring these reductions.

Source: UTZ Certified (2012).

Box 5.2 Climate in the 4C Code of Conduct



The 4C Association Code of Conduct addresses climate in as part of its work to create good enabling environment, capacity building on climate change adaptation and mitigation, facilitating and supporting access to useful climate data and early warning systems for extreme weather events. Other areas of the code addressing climate change are:

Natural resource management
Conservation of biodiversity, including protected or endangered native flora and fauna is supported
Sustainable forest Management practices are being Followed
Degraded agricultural land is Restored
Water resources are conserved and Water harvesting Mechanisms are explored

Soil and crop management
Soil conservation principles are in place
Research on different varieties and their climate suitability is facilitated and supported
Chemical pesticides are used appropriately
Fertilisers are used appropriately
Organic matter and shade management is in place
Coffee plots are physically secured against (extreme) weather events

GHG emissions / stocks
Greenhouse gases stored in the coffee ecosystem are kept at the same level or increased

On-farm emissions are minimised

Source: 4c Association (2012).

Another example is the Sustainable Agriculture Standard, which uses GAP designed primarily to address environmental issues. The Sustainable Agriculture Standard has generated some positive environmental and social impacts and more rewarding, stable markets for producers (Giovannucci et al., 2008). A literature review (Rainforest Alliance, 2011) of 19 farming practices including improved fallows, reduced tillage, inorganic fertiliser use, on-farm processing and the use of shade trees - as well as related non-farm practices by farmer households such as domestic wastewater management, biochar and household energy use, aimed to identify agricultural practices for coffee, cocoa and tea that are climate smart. Climate smart was defined as reducing emissions of greenhouse gases (GHGs) from land use, machinery and chemicals, leading to an increase of on-farm carbon stocks, and/or improving the resilience of agro-ecosystems and farming communities to adapt to a changing climate, compared to local, business-as-usual practices. This study confirmed that a number of farming practices are complementary in their ability to affect GHG emissions and carbon storage and combining them can result in more-than-additive gains. These include mainly the following: reduced tillage, cover crops, shade trees, pruning and organic residues, and inorganic fertilisers. In combination, these can interact to protect soils and reduce erosion, moderate soil temperature, reduce moisture evaporation and increase infiltration, maintain or increase soil fertility, reduce weeds, and lessen the use of purchased inputs by farmers. Also, some multi-purpose practices have benefits in the cropping systems considered. For example, single CFPs, such as cover crops, shade trees, and organic mulch can simultaneously affect numerous system attributes such as weeds, pests, erosion, carbon and soil nutrients, and soil temperature and moisture. The study found that using improved fallows, application of pruning and organic residues, and proper utilisation of shade trees were the three farming practices that offered the greatest potential for enhancing farm resiliency and adaptive capacity, as defined by their ability to moderate temperature, mitigate drought/conserve soil moisture, protect soils and reduce erosion, and enhance livelihoods through contributing to improvements in yield or productivity, or provisioning of secondary products.

Practices that result in 'quick-win' emission reductions/enhances in carbon stocks, relative to others assessed, include: use of short-term improved fallows and cover crops, optimised usage of inorganic fertilisers, and improved irrigation practices (e.g. drip irrigation) and more efficient crop processing, although access to credit and capital may prevent many farmers from adopting some of these. Practices offering the greatest total gains include proper utilisation of inorganic fertilisers and use of shade trees. Due to its immediacy of impact and scale of potential gains, improved fertiliser usage may be a first-order priority for implementation of climate-friendly practices. Certified farms implement activities that promote long-term improvement of the soils that support agricultural production. These activities include increasing ground cover to prevent soil erosion, which allows for and maintains carbon storage in the soil. Tree planting is promoted, since trees hold soil moisture and make farms more resilient to erratic rainfall and other effects brought about by a changing climate. The standard also requires careful application of fertilisers and giving priority to organic fertiliser generated on the farm, thus minimising greenhouse gas emissions and carbon based emissions associated with their use, production and transportation. Certified farms reduce the amount of waste they produce and thereby not only decrease GHG emissions directly, but also indirectly by saving energy and materials from non-renewable sources used to produce the discarded items. The SAN Climate Module (Sustainable Agriculture Network, 2011) continues on this path of promoting sustainable agricultural production through a specific voluntary set of climate change adaptation and mitigation criteria which supplement the existing Sustainable Agriculture Standard. The climate-friendly criteria reinforce existing certification criteria and provide additional value. Those farmers who achieve compliance with the module will be able to assess the risks posed by climate change to their farms and communities; analyse their practices to quantify and reduce the GHG emissions generated by growing, harvesting and processing activities; and increase the levels of carbon stored on their farms through the restoration of degraded lands, reforestation and improved soil conservation while also be able to better adapt to altered growing seasons and other conditions.

6 Ways forward: making agro-food standards climate smart

This section discusses the barriers and ways forward to how climate related issues have been incorporated into standards and the roles that institutions and stakeholders have and can play to advance these further.

Barriers

Barriers to the adoption of climate-smart GAP vary, and mirror general problems implementing GAP as part of standards and certification systems (Hatanaka et al., 2005). These include difficulties to access land, a lack of land, problems of climate-smart or improved seed availability, the need for technical assistance and training to implement given practices and capital and labour constraints. Further, implementation of a given practice needs to be assessed in the local context to minimise the risk of adverse impacts (Rainforest Alliance, 2011).

Smallholder farmer adoption of climate-smart GAPs will only be realistic when they contribute tangible economic benefits to farm economics, such as reducing input costs, enhancing yields, and improving land management. There are a number of reasons why poorer farming communities in developing countries are at a particular disadvantage to be able to react to climate change. FairTrade names two important reasons: (a) Lack of funds and resources and (b) Lack of knowledge about alternatives (FairTrade, 2013b). First, there is always a cost associated with a switch to different farming practices and poorer farmers often do not have the knowledge and money to support a switch. For example to combat reduction in water availability, irrigation methods can be changed to drip irrigation, but it is expensive. Poor rural areas often lack insurance and credit services. Second, switching away from what you know is inherently risky. Farmers can see the changes that are occurring but are unsure how to adapt to the changes. For example their extensive knowledge of the seasonal rains is no longer useful due to erratic weather, the increase/decrease in rainfall and/or an altered rainy season. Poorer farmers are less able to accept risk than the relatively better off and will tend to diversify towards lower risk and therefore (sometimes) less profitable activities. Thus standards which already place onerous costs (particularly short term costs) and whose benefits are either long term or not economic in the short term, may struggle to be accepted if further climate-smart GAPs are not economically attractive.

The development of standards addressing climate change, adaption and mitigation, such as REDD (Reducing Emissions from Deforestation and Forest Degradation) and carbon have been lengthy, and the relationship with agricultural practices has only recently started to occur. For example, the UN Framework Convention on Climate Change has only recently decided to define parameters for how REDD will address incorporate on agricultural carbon by 2012 (RESOLVE, 2012). Certification programs that already address carbon and greenhouse gas emissions have tended to use different carbon calculators with different methodologies and boundaries and thus their role in the REDD debate could be strengthened when these methodological issues are clarified and addressed.

Integrating climate smartness into standards creates a non-tangible dimension of a product's certification. As standards can be both a market differentiation and competition tool, as well as providing a level playing field, a clarification of their status in international trade is critical. The lack of clarity by World Trade Organization (WTO) on private voluntary labels may be a major barrier for adopting climate-smart add-ons. Acknowledging their complexity and concerns about their negative influence on developing countries' and small businesses' ability to export, WTO members have been struggling with the question of how standards and labelling is used to inform consumers about environmental and social protection without jeopardising or discriminating against these 'weaker' players. Opinions have been divided since discussions started on how to regulate production and process methods (PPMs) since the creation of the WTO in 1995. Little progress has been made towards an international agreement on how to deal with PPMs, with strong reactions provoked whenever PPMs are mentioned (Borregaard and Dufey, 2005). A particularly

thorny issue in the debate has been the use of criteria linked to PPMs. WTO Members agree that countries are within their rights under WTO rules to set criteria for the way products are produced, if the production method leaves a trace in the final product, for example coffee grown using pesticides leaving residues in the beans (WTO, 2013). However, they disagree about discriminatory measures based on 'unincorporated PPMs' (or 'non-product related PPMs'), that is process and production methods which leave no trace in the final product. For example one cannot tell whether a coffee bean has been farmed sustainably or climate smartly simply by looking at it. Thus a barrier is whether these certification standards are consistent with WTO agreements, as many countries, particularly developing country producers, argue that measures which discriminate between products based on unincorporated PPMs, such as in some standards, should be considered inconsistent with WTO agreements as constituting unfair trade barriers to export.

Opportunities

It is expected (RESOLVE, 2012) that the growing awareness and global attention to address climate change will mean that by 2020 certification programs will have to take account of the carbon footprints of agri-food product chains. Despite this encouraging scenario, to holistically address both sides of climate change and be climate smart, standards will need to move from a focus on mitigation to include adaptive options, which are linked to good farm and agricultural practices.

Research (Rainforest Alliance, 2011) has highlighted that a crop- and country-focus is needed to determine climate-smart GAPs. Currently practices concerning shade cover and agroforestry are the most documented and evidenced, however additional knowledge on the relative carbon storage impacts across different gradients of shaded systems and for different countries is advised, with definitions of various types of agroforestry practices (e.g. simple production shade; complex production shade; hedgerows; boundary planting; complex rustic agroforestry). Also on the impacts of crop processing on GHG emissions.

New partnerships between standard setting organisations with partners, such as NGOs, governments and international organisations, has been shown to bear fruit in terms of creating new dynamics, modifying and extending standards. This has both generated more business and provide greater services to clients of the standard, and added-on new issues, such as climate smartness, in standards. Given the large number of major standard setting organisations which have not yet addressed the climate smartness of their schemes (e.g. ISO, IFS), there are major opportunities for up-scaling. Given the intense competition in the standard-setting business, climate smartness could be an opportunity for standards to differentiate them levels and to expand the product attributes covered by a standard.

Private and public standards can be mutually reinforcing when governments engage with private standard setting bodies and coalitions through international organisation such as the WTO, FAO, WHO and OIE in standard setting mechanisms. Examples of such initiatives are government efforts which promote standards through the Dutch Sustainable Trade Initiative, benchmark corporate social responsibility efforts, such as the Netherlands Transparency Benchmark. Public support has also been seen to go beyond regulation to providing facilitating, endorsing and enabling environments in support of adoption of and compliance with standards, including technical assistance for their implementation, as part of aid-trade deals, based on examples from public private partnerships in the Netherlands (Braga et al., 2010; Drost et al., 2012). Another positive opportunity for government engagement is where local governments to strengthen the role of national legislation. In the case of the EU this has been done in twinning projects (e.g. introduction of cross-compliance system in New Member states) and between south-south country exchanges (RESOLVE, 2012). Donor agencies and development partners support for building the scientific and technical capacities in developing countries that would facilitate their compliance to food safety (and to climate-smart practices) is another possibility for partnerships, where it translates prescriptive private standards into good practices. Examples of this are the work of the CBI in the Netherlands (CBI, 2013) and the FAO (Liu, 2007). The role of governments in producer countries is profound in developing obligatory regulations from voluntary standards, for example, in response to the chronic overuse and misuse of pesticides in agriculture, governments in Southeast Asia (Indonesia, Malaysia, Philippines, Thailand, and Vietnam) have introduced public GAP standards (Schreinemachers et al.). Voluntary private standards and practices can also become marginalised by the subsequent development of governmental standards, as

has occurred with organic agriculture standards in many developed countries, as governments have regulated the production, marketing and labelling of organic foods since the 1990s (EU) and early 2000s (USA, Japan). Although private organic standards continue to exist alongside public standards due to consumer preferences (Clarke, 2010).

A growing number of tools, methodologies and models are available to quantify the emissions impacts of the farming practices. These, however are predominantly used by researchers or in terrestrial carbon projects and not in standards. One of the few tools geared towards farmers and non-technical users is the Cool Farm Tool, although it was requires modification to make it applicable to agroforestry crops (Rainforest Alliance, 2011). The examples of GHG accounting in the sugar and palm oil sector standards provide possible models for other agricultural sectors.

Those interested in standards setting have a range of alternatives in how to make standards climate smarter, making it possible to adapt to the nature of a standard scheme and its products, location s and actors. One is to use a GAP approach and create clearly defined and verifiable criteria and associated climate-smart practices that supplement or replace existing GAP. This can add value to a product and standard, and the benefits for its users, especially farmers, who should be able to better assess the risks posed by climate change to their farms and communities; analyse their practices to quantify and reduce their GHG emissions generated by growing, harvesting and processing activities; and increase the levels of carbon stored on their farms through the restoration of degraded lands, reforestation and improved soil conservation while also be able to better adapt to altered growing seasons and other conditions. A variant of this is to specify a range of practices, making some voluntary and other mandatory, particularly if they coincide with other environmental and/or social objectives of standards. An alternative is not to specify GAPs, but the emissions targets which could help to mitigate climate changes. This could involve offering a range of (proven) mitigative and adaptive practices which could help achieve targets. Monitoring and measuring may however be a practical problem of this approach. A third route could be a hybrid of targets and practices.

7 Conclusions

Climate-smart agricultural practices do already exist in standards. Standards offer a good possibility to out-scale and up-scale such practices further in developing country agricultural systems. However evidence of their effectiveness in mitigating climate change and increasing resilience and adapting to negative climate changes often still remains to be proven. Examples from different commodity-based standards, such as coffee, cocoa, tea, oil palm and sugar, and general agricultural standards offer a range of models for how climate smartness can be assessed and different ways of implementing it into existing standards. The growing range of carbon-based standards offer another possible route to address climate change in agricultural practices.

However, climate smartness is currently not integrated into the majority of GAP in agri-food standards and these two streams of thought (GAP for environmental and social improvement and climate smartness) are largely separate. Even the major proponents of both of these systems, such as the FAO and the majority of standards using GAP, do not link the two. This reinforces the need for greater consistency between agriculture, food security and climate change policy-making and practice at national, regional and international levels.

Signs have emerged however in the last two years of some cross-fertilisation between these fields. For example, a handful of standards have started to calculate and monitor their climate footprint, others have assessed which good agricultural practices they currently embrace are climate smart, and one has actively added on climate-smart GAPs. It is too early to be able to assess the implications of this for actors in the value chains of agri-foods, and if these practices are really effective in being climate smart, reducing vulnerability, increasing adaptability and mitigating the impacts of climate changes.

The majority of voluntary and mandatory GAP schemes in standards are top down driven (i.e. from government, consumer and retailer) to farmers. This has implications for their uptake. If the incentives for farmers to adopt climate-smart GAP are costly and involve long term payback, with farmers bearing the burden of additional certification costs, the longer term and non-direct financial benefits may be outweighed by the need for short term financial returns from farming. Thus making GAP climate smart as part of standards should also be economically smart, and not impose additional financial or technical burdens on farmers.

Integrating climate smartness into GAP thus means that the benefits on a global level from reduced GHG emissions also need to be demonstrated at the local, farmer level - and be clear to those proposing and aiding farmers to implement such schemes into standards.

There is a clear need for the involvement of not just all the different business and producer actors involved in private standards, but other stakeholders to become more engaged. This is particularly so for governments from consumer, end-of the chain countries but also producer countries, on the impacts of climate-smart GAPs. This includes the social-economic impact, implications for food safety, quality and security, and for competition and trade. The role of NGOs, consumer and work representative organisations and research community is also critical to make climate-smart GAP work. Transparency, monitoring and impact evaluation are key aspects in making existing practices climate-smarter and developing new practices feasible and acceptable.

Governments and their agencies have played a critical role not only in creating an enabling environment for certification but in providing mandatory and complementing standards through regulations, policy frameworks and other measures that set minimum acceptable performance and ensure food safety and food quality. CSA strategies need to be incorporated into legal and regulatory frameworks if they are to be implemented. Strategies also need to take account of current legislation and regulations, where a strong role of government is expected. As standards become more and more international, a role for governments is to ensure science-based standards setting and the involvement of developing countries.

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Appendix 1

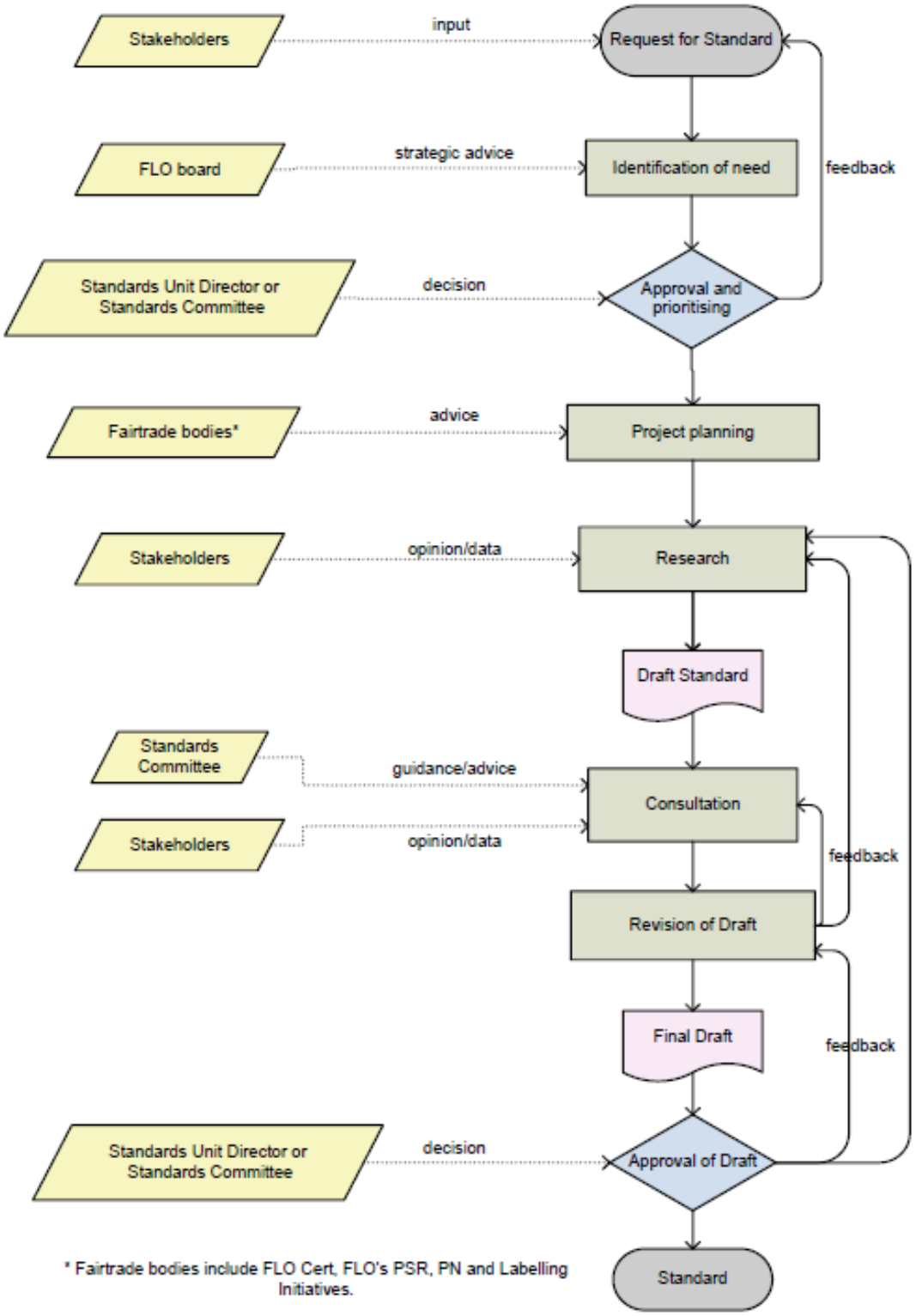
Figure A1.1 Private and public food standards and certification schemes

Standard 'owner'	Private												Public
	Business					NGO							
Standard objectives	Chain management			Product differentiation, value adding. Market access/exclusion		Sustainable, ethical, social practices							Competition, market access, regional development, food safety
Designed for	Suppliers, retailers, lead firms			Producers, sector		Some or all chain actors, especially producers							Some or all chain actors, especially producers
Focus	Food safety	GMO-free	Product quality	Food safety, environmental & social issues	Product quality	Organic	Natural resource conservation	Fair trade	Social rights	Religious	Product origins	Animal welfare	Organic, food safety, consumer, environmental & social issues
Examples	Filière Controlleé (Auchan) GlobalGAP British Retail Consortium Global Standard(UK) SQF	Non-Gmo Project Organic	Nature's Choice (Tesco) Filières Qualité (Carrefour) Field-To-Fork (Marks & Spencer) P.Q.C. (Percorso Qualità Conad) AH Excellent (Albert Heijn Bv)	Max Havelaar (Nl) Marine Stewardship Council (MSC) Aquaculture Stewardship Council (ASC)	Assured Food Standards (Uk) Freedom Food (UK) Qualitat Sicherheit (Germany) Assured Combinable Crops Scheme (Uk) Farm Assured British Beef And Lamb (Uk) Sachsens Ahrenwort (Gemrany) Sachsen Qualitatslammfleisch Germany)	Organic Ifoam Soil Associaiton	Rainforest Alliance Utz Bird Friendly Dolphin Friendly Conservation Agriculture	Fairtrade Ecocert Bio-Equitable IMO	SA-8000 Fairtrad e	Halal Kosher	Qc Emilia Romagna (Italy) Stichting Streekproduction (Netherlands) Vlaams Brabant (Belgium) Local Food Movement	Bird Friendly Dolphin Friendly Free Range Assured Food Red Tractor Standards	EU Ecolabel EU Geographic Origin Pgi & Pdo EU Organic
Scheme type	B2B	B2B B2C	B2B	B2C	B2C	B2B			B2B B2C	B2B	B2C		B2C
	Voluntary, individual company & collective, standards based					Voluntary, collective, standards based							Voluntary, collective, Regulatory based
Product labels	No & Yes	Yes	Yes&No	Yes&No	Yes								
Main costs borne by	Producers, exporters			Consumers, producers		Consumers, producers	Producers	Consumers	Producers	Producers	Producers, consumers	Producers, consumers	Producers, consumers

Adapted from: (Henson and Humphrey, 2009; Liu, 2009).

Appendix 2

Steps of FairTrade standard setting procedure



Source: FairTrade (2012).

LEI Wageningen UR develops economic expertise for government bodies and industry in the field of food, agriculture and the natural environment. By means of independent research, LEI offers its customers a solid basis for socially and strategically justifiable policy choices.

Together with the Department of Social Sciences and the Wageningen UR, Centre of Development Innovation, LEI Wageningen UR forms the Social Sciences Group.

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