SUSTAINABLE AGRICULTURE NETWORK

Sustainable Agriculture Framework 2021

SAF

SAN

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I. Introduction

By 2050, the agriculture sector will face an unprecedented confluence of pressures. With a projected 30% growth in the global population, competition for increasingly scarce land, water and energy resources will intensify, and production will have to increase to feed the world and adjust to changes in dietary patterns. Achieving higher levels of production in the face of the threat of climate change, with an already seriously depleted natural resource base, is impossible without significant changes in food systems and the way that agriculture is practiced (FAO, 2015a).

The FAO (1988) defines sustainable agriculture development as:

> …the management and conservation of the natural resource base, and the orientation of technological change in such a manner as to ensure the attainment of continued satisfaction of human needs for present and future generations. Sustainable agriculture conserves land, water, and plant and animal genetic resources, and is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.

In the future described above, sustainable agriculture represents one of the main opportunities to change the course of food production and agriculture and contribute to the Sustainable Development Goals.

SAN's vision of sustainable agriculture is one where agricultural activity contribute to biodiversity and natural resources conservation, while ensuring the sustainable livelihoods for the millions of people that directly depends on agriculture. At SAN we see clear opportunities to transform agriculture from the farms up and through the associated agricultural value chains by expanding and accelerating the transition to a sustainable and equitable global food system. This will ensure not only food security, but also provide economic and social opportunities for people and protect the ecosystem services on which agricultural production depends.

II. Sustainable Agriculture Framework

The Sustainable Agriculture Framework translates SAN's vision into a practical and science-based approach towards sustainable agriculture, that answers both the needs of agricultural and livestock producers and the sustainability expectations of an increasingly demanding global market.

The **SAN Theory of Change** explains how SAN's new focus aims to **enable sustainable rural landscapes, characterized by positive-impact agriculture, agroecosystems that are resilient to climate change and a better quality of life for rural communities.** It provides the basis for establishing specific sustainability goals to guide the transition to a highly productive, economically viable, environmentally friendly, and socially fair agriculture.

1. Positive impact agriculture:

SAN works towards rural landscapes where natural ecosystems are protected and restored, and agricultural and livestock production reduce their carbon, toxicity, and water footprints:

a) greenhouse gas emissions are minimized by increasing the use of clean and renewable energy, reducing the use of products derived from petroleum/fossil fuel, and optimizing fertilizer management;

b) on-farm ecosystems and biodiversity are protected and restored to enhance and maintain the ecosystem and cultural services they provide, including their function as carbon sinks;

c) integrated pest management strategies are adopted to reduce the negative impact of synthetic pesticide and fertilizer residues on aquatic ecosystems and plant, animal, and human populations;

d) the use of pesticides with unacceptable risks is eliminated or phased out;

e) soil conditions are optimized to prevent soil erosion and depletion;

f) all water sources are conserved, and water is used efficiently; and

g) waste production is minimized, and originated waste is categorized, reused, recycled, or deposited in a way that does not negatively affect soil, water, air, animals, plants, or people.

2. Agroecosystems resilient to the effects of climate change

SAN develops and supports intervention strategies that promote agroecosystems diversity to better adapt to current and future climate conditions, while maintaining and enhancing productivity, and efficiently using available natural resources:

a) agroecosystems are diversified by planting trees, establishing non-crop vegetation, and conserving areas of natural ecosystems or native vegetation surrounding production areas;

b) crop and livestock species and varieties are selected according to climate and soil conditions and land use capability;

c) soil condition is enhanced by implementing mechanisms and practices to preserve its biodiversity, control erosion, retain moisture, increase the carbon and organic matter content, and avoid pesticide use, and soil compaction and contamination;

d) water sources are protected, and irrigation systems are efficient and well maintained to ensure optimum productivity; and

e) weather patterns are monitored and available data on climate variability is analyzed to enable informed decisions about necessary production system changes.

3. Better quality of life for rural communities

SAN recognizes the contribution of rural communities and their inhabitants to agricultural and livestock production. Vibrant rural communities are important for sustainable and profitable production systems and conservation initiatives in rural landscapes. SAN believes that sustainable agriculture and livestock production are not possible without a better quality of life for communities, producers, agricultural workers, and their families:

a) productivity is improved to achieve better incomes for producers and agricultural workers, and to advance towards food security and the elimination of hunger;

b) human rights are not infringed upon in rural landscapes;

c) rural communities' rights are respected, land use is lawful and free of disputes, and communities' access to their natural and cultural resources is guaranteed;

d) women and girls' rights are respected; and gender equality and women empowerment are promoted;

e) agricultural and livestock operations provide decent rural employment opportunities, and workers and producers earn living incomes that allow them access to their basic needs: safe and hygienic housing, a nutritious diet, and access to health and education services and potable water; and

f) labor rights of agricultural workers are respected according to the eight fundamental ILO conventions:

    i. Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)
    ii. Right to Organise and Collective Bargaining Convention, 1949 (No. 98).
    iii. Forced Labour Convention, 1930 (No. 29) (and its 2014 Protocol).
    iv. Abolition of Forced Labour Convention, 1957 (No. 105).
    v. Minimum Age Convention, 1973 (No. 138).
    vi. Worst Forms of Child Labour Convention, 1999 (No. 182).
    vii. Equal Remuneration Convention, 1951 (No. 100).
    viii. Discrimination (Employment and Occupation) Convention, 1958 (No. 111).

A sound indicator framework converts the expected SAN sustainability impact and outcomes into a practical management tool that help agricultural and livestock operations to develop intervention strategies and allocate their resources accordingly and efficiently. It also facilitates the implementation of an M&E system to measure progress towards sustainable agriculture and the "sustainability status" of each specific operation addressed.

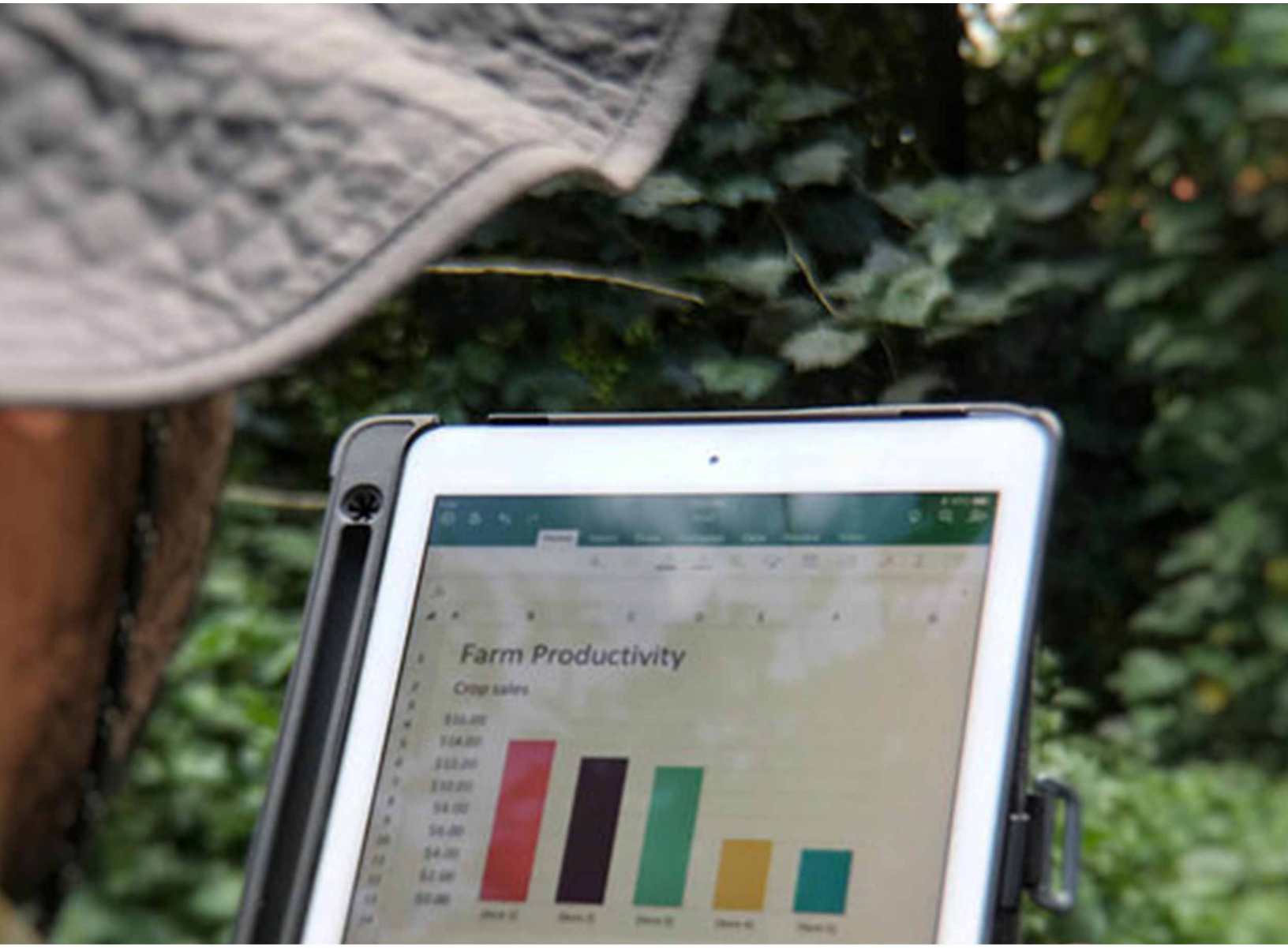
Those indicators within the Sustainable Agriculture Framework can be used to identify, simplify, implement, and quantify the agricultural and environmental aspects of sustainability. They offer a way to proceed from the theoretical definition and objectives of sustainable agriculture to more practically oriented intervention strategies that are specific for each production system and its surrounding conditions.

Sustainable Agriculture Framework's Structure

The Sustainable Agriculture Framework is composed of ten chapters that summarize the impact areas in which SAN works. Each chapter contains an introduction that explains SAN approach and vision, and indicates:

- Sustainability goals. Specific goals within each impact area that facilitates the transition of the production processes and supply chains towards sustainability.
- Outcomes. Expected changes enabled by the implementation and verification of a set of practices within production systems.
- Performance indicators. Specific actions to be implemented and asses to indicate the "sustainable status" of an agricultural operation or process.

As impact areas are interconnected, it is possible that implementing or evaluating one of the performance indicators contributes to progress towards more than one of the sustainability goals as defined by SAN.



Sustainable management of agricultural and livestock operations

III. Impact areas

A. Sustainable management of agricultural and livestock operations

Agriculture depends to a large extent on the services provided by natural and managed ecosystems. Sustainable agriculture approaches focus on optimizing production while minimizing negative environmental impacts and promoting actions for the protection, conservation, restoration, enhancement, and efficient use of natural resources.

Through sustainable agriculture practices, a balance is sought between the protection of the natural environment, the productivity of agricultural ecosystems, and the satisfaction of the needs of the growing world population by offering decent and resilient livelihoods (FAO, 2015a). Within this sustainability approach components are not individual units, but rather the productive landscape and its impact areas comprise a complex and dynamic system where interrelationships are constantly occurring.

To achieve this vision of agricultural sustainability, it is necessary that intervention strategies are integrated and adaptable to the conditions of each specific context. They require the implementation of sustainable management systems of multidimensional scopes that cover both social and environmental issues, with an emphasis on the identification of production risks and the planning of activities to mitigate those risks.

SAN offers solutions for the implementation of sustainable management systems that allow:

- the implementation of functional social and environmental management systems that can be adapted to the specific characteristics of productive landscapes;
- responsible management of service providers to reduce the indirect impact on ecosystems and natural resources;
- increased productivity through an optimization of resource use;
- the implementation of mechanisms to ensure the traceability and integrity of agricultural and livestock products; and
- the transformation of stakeholders along the supply chain to facilitate continuous improvement and achieve sustainability along the journey.

A.1. Sustainability Goal: Social & environmental management system

Outcomes	ID	Performance Indicators /Best practices
Operations address environmental and social risks to reduce the negative impacts of their activities.	A101	Operations implement a Social and Environmental Management System (SEMS) to organize all the sustainable management actions and measures, including procedures and action plans for the following topics: – protection of natural ecosystems (ecosystems and biodiversity); – protection and sustainable use of natural resources (water, soil, energy); – IPM and agrochemical management; – waste management; – occupational health and safety; – workers' rights and wellbeing; and – community rights and wellbeing.
	A102	Operations review and update the SEMS regularly to accurately reflect the reality of their operations, workforce, and productive systems.
	A103	Operations designate enough time and resources to progressively implement the SEM system.
	A104	Operations map their production plots, roads, and infrastructure, (including protected areas), with clear boundary delineation of the operations' geographic extent.
	A105	Operations have a description of baseline information that includes: – total area; total production area and total area of natural ecosystems; – production plots' data, containing but not limited to crop/pasture type/variety; crop/herd density; crop/pasture management practices; annual yields; and - composition of their workforce.
	A106	Operations identify all national and local legislation applicable to their productive activities
	A107	Operations demonstrate actions for compliance with applicable legislation.
	A108	Operations conduct an independent environmental and social impact assessment (ESIA). In cases where there is no applicable legislation for conducting ESIAs, thresholds can be defined according to the operation's specific risks.
	A109	If the ESIA detects significant social and environmental impacts, operations implement actions to mitigate such impacts and document them.

Outcomes	ID	Performance Indicators /Best practices
Operations address environmental and social risks to reduce the negative impacts of their activities.	A110	Operations use the data collected during their regular assessments and the ESIA (if applicable) to plan their activities, and to improve and update the SEMS.
	A111	When required by applicable legislation or when operations' activities have negative impacts on the land or resource use rights or collective interest of the communities, operations conduct a Free, Prior and Informed Consent (FPIC) process with local communities as part of the ESIA, to ensure that there is full consent and fair compensation for any loss of access to land or resources.
Workers know how to carry out their tasks efficiently and safely.	A112	Operations implement training activities for management and workers to enable the correct and safe conduction out of their tasks.
	A113	Operations train all their staff during normal working hours and do not apply any wage deductions for the time spent in training activities.
	A114	Operations document and keep records of all training activities, including information about: – training topic; – number of women and men trained; and – attestation of each worker that s/he participated in the training.
	A115	Workers demonstrate that they know how to carry out their assigned tasks.

A.2. Sustainability Goal: Productivity management

Outcomes	ID	Performance Indicators /Best practices
Production input use is optimized to improve productivity.	A201	Operations implement a productivity management program[1] to increase productivity; including activities for: – soil conservation and management; – water conservation and management; – integrated pest management; – keeping and updating records of input use (including at least: water, pesticides & fertilizers); – keeping and updating harvest and yield records; – estimating production and yield volumes per production unit; and – calculating results of input use per production unit or per product produced.
	A202	Operations analyze input use and production records annually or after every harvest season to optimize the use of inputs.

[1] A program is considered as a set of related measures or activities with a long-term aim.

A.3. Sustainability Goal: Service providers management

Outcomes	ID	Performance Indicators /Best practices
Operations' service providers have the competences to carry out their work and comply with applicable legislation.	A301	Operations monitor service providers and ensure that they comply with applicable legislation for the work they conduct with or within the operation.
	A302	Operations define monitoring frequencies according to the contracted service type and frequency.

A.4. Sustainability goal: Traceability and product integrity

Outcomes	ID	Performance Indicators /Best practices
Traceability and product integrity are guaranteed throughout the supply chain.	A401	Operations implement a traceability system to monitor the origin, quantities, destinations (buyers) and claims of all products harvested, purchased, in stock and sold for or within the operation. The program[2] includes: – actions for controlling the reception, processing, mixing, storing, packaging, labelling, delivery, transport, and resale of products coming from operations within the system; – measures to avoid the overselling of product; and – records of all product harvested, purchased, in stock and sold for or within the operation, including also: • yield estimation methods and mechanisms for accurate calculations; and • any differences between the total volume harvested and the total volume available.
	A402	If operations sell product as outputs, or buy third-party products as inputs, they keep records of purchase and selling operations and the inputs and products in stock.
	A403	If operations buy third-party products, they keep product receipts that record of the products' origins, including name, and location of producer, date of purchase, type of product and volume.

[2] A program is considered as a set of related measures or activities with a long-term aim.

Outcomes	ID	Performance Indicators /Best practices
Traceability and product integrity are guaranteed throughout the supply chain.	A404	If operations harvest, purchase, store, pack, label or sell product from third-party operations: - actions are implemented to avoid product mixing: products from operations within the system are kept separate from those outside the system during reception, processing, mixing, storing, packaging, delivery, transport, and release, to preserve the product's integrity according to its claim; - products from third-party operations or different claims can be visually identified at any time; - when applicable, operations document conversion factors or processing ratios; and - procedures are implemented and documented to reduce and correct the accidental mixing of products.
	A405	Operations' personnel receive training about traceability and knowhow to preserve product integrity.

A.5. Sustainability Goal: Harvest and post-harvest management

Outcomes	ID	Performance Indicators /Best practices
Harvesting practices ensure product quality and safety.	A501	Operations monitor crop quality, maturity indexes and weather conditions to decide on an optimal harvesting time.
	A502	Operations implement Pre-Harvest Intervals (PHI) as defined in the applied product's MSDS, label or security tag, whichever is more stringent. When two or more products with different PHIs are used at the same time, operations apply the longest interval.
	A503	Operations do not use human sewage, nor untreated manure or wastewaters in any production or processing activities to avoid contamination of crop and production by pathogens. If treated wastewater is used in production and/or processing activities, its use is compliant with the applicable legislation.
	A504	Operations disinfect harvest machinery and equipment to minimize the risk of pathogens transfer between production plots or farms or crop infestation.
	A505	Operations periodically test samples of their harvested products for the absence of pathogens and pesticide residues.
	A506	Operations train all field personnel in charge of harvesting – related activities about product quality and safety practices.
Storage practices and facilities safeguard the products' quality and safety.	A507	Operations store harvested products in safe facilities with: a. access only to trained and authorized personnel; b. controlled ventilation, humidity, temperature, and pest infestations; and c. regular cleaning and maintenance activities.

Outcomes	ID	Performance Indicators /Best practices
Storage practices and facilities safeguard the products' quality and safety.	A508	Operations monitor and control pests within storage facilities minimizing the risks of product contamination, agrochemical's spillage, and the spread of disease vectors.
	A509	Operations keep all storage areas and facilities clean and free from residues and debris.
Processing activities use resources efficiently and safeguard the products' quality and safety.	A510	Operations document all processing processes conducted within their scope, including: a. a description of the processing activities; b. a process diagram or flow chart; c. a map or croquis of their processing facilities; and d. the personnel in charge of the processing activities and facilities.
	A511	Operations only use safe water for processing activities. Safe water is: a. free of intestinal pathogens; b. free of fecal matter and coliforms; and c. in compliance with the parameters defined by applicable legislations and buyer requirements.
	A512	Operations avoid excessive use of energy during processing by: - energy saving practices, - energy efficient equipment and devices, or - training processing staff about energy savings.
	A513	During dehydrating processes, operations monitor product humidity levels for optimized use of energy and compliance with product quality parameters, including shelf-life.
	A514	Operations only use post-harvest products that are authorized by applicable legislation both at the place of processing and the place of product destination. Post-harvest product[3] avoid moisture loss and pest or disease attacks and slow down undesirable chemical changes.
	A515	Operations train their personnel to carry-out cleaning and disinfecting activities.
	A516	Operations ensure that induced or artificial ripening processes are conducted only if necessary and using only authorized products according to applicable legislation on both the place of origin and the place of product destination.

[3] Post harvest products widely refer to all substances used to maintain and/or enhance the harvested products quality and slow down natural decay, including fungicides, insecticides, maturity inducers and/or waxes.

Outcomes	ID	Performance Indicators /Best practices
Processing activities use resources efficiently and safeguard the products' quality and safety.	A517	Operations do not use calcium carbide to induce ripening processes.
	A518	Operations implement pest monitoring and management measures to control pests within processing facilities to minimize the risk of product contamination and/or spoilage, and the spread of disease vectors.
	A519	Operations collect all biodegradable organic residues and compost or treat them for reincorporation to the fields or handle them over for third party treatment. Waste treatment from third-partis is considered as a shared responsibility with the operations' management.
	A5020	Operations implement best manufacturing practices for the design, access and maintenance of/to their processing activities and facilities.
The packaging processes reduce environmental impacts and maintain the products' quality and safety.	A521	Operations use biodegradable packaging materials. If using biodegradable packing materials is not feasible, then operations: a. avoid using non-recyclable packaging materials; and b. offer alternatives to their buyers and clients to recycle or reuse the empty packaging.
Post-harvest food waste is minimized.	A522	Operations grow different crop varieties for early, mid, and late harvesting considering market demand and agronomic management.
	A523	Operations reduce crop and product losses during harvesting by: - harvesting during the coolest time of the day; - keeping recently harvested crop/products in a cool and shady area before storage and/or processing; - minimizing impact of the crop/product dropping to the ground; and - using specialized harvesting tools and machinery.
	A524	Operations implement strict hygiene protocols to control and regulate entrance and movement to and within storage and processing facilities.
	A525	Operations use and/or donate harvested crop/products that do not comply with the required quality parameters by the market but remain safe for consumption.
	A526	Operations use risk analysis to define and monitor critical control points during their harvest, storage and/or processing activities.

Biodiversity conservation and management

B. Biodiversity conservation and management

Biodiversity plays an important role in the provision of goods and services to people all around the world and is critical for economic development and poverty alleviation (Millennium Ecosystem Assessment, 2005). More than three billion people depend on coastal and marine biodiversity and 1.6 billion more depend on wood and non-timber forest products. Around 70% of the global poor live in rural areas, where as much as 50% to 90% of livelihoods are sourced from non-marketed goods and ecosystem services (CBD, 2017).

The agriculture sector is highly dependent on the services generated by natural ecosystems. These provide the sector with a wide range of services that include pollination, pest control, genetic diversity for future agricultural and livestock use, soil retention and structure, and the regulation of soil fertility, nutrient cycling, and water supply (Power, 2010).

Yet biodiversity and ecosystem services supporting agriculture and people's livelihoods continue to be at risk of loss and degradation. Analysis of the major primary sector activities indicate that drivers linked to agriculture production account for up to 70% of the projected loss of terrestrial biodiversity (CBD, 2014). This poses a great challenge to the natural environment because it depends on the same resources as agricultural production, and because certain widespread agricultural practices have a negative impact on the environment (Tillman, Balzer, Hill & Befort, 2011; Tanentzap, Lamb, Walker & Farmer, 2015).

The use of land resources for agriculture prioritizes crop and livestock production over the many benefits that natural ecosystems provide (Tanentzap et al, 2015). Although there is an increased adoption of good agricultural practices (CBD, 2014), unsustainable practices in agriculture are abundant and cause substantial environmental degradation and biodiversity loss, while also reducing agricultural productivity in the longer term.

SAN's approach focuses on the five principal causes of pressure on biodiversity:

- climate change,
- deforestation, habitat loss and degradation,
- excessive nutrient loading and other forms of pollution,
- overexploitation and unsustainable use, and
- invasive alien species.

The Sustainable Agriculture Framework has refined its "natural ecosystem" -concept to better support the design, development and implementation of ecosystem conservation and restoration initiatives in agricultural landscapes worldwide (SAN, 2017 and 2018).

Based on this Framework, SAN proposes the design of biodiversity management programs within agricultural and livestock operations that:

- promote environmental and social impact assessments (ESIA) prior to land use conversion or expansion of the operations activities;
- identify all nearby natural ecosystems and protected areas to implement better conservation practices;
- avoid the degradation and destruction of natural ecosystems;
- establish buffer zones to prevent any alteration in the balance of natural ecosystems;
- maintain, restore, and increase the non-crop canopy covers and protect large native trees;
- identify protected and endangered species that have their habitat within or near the operations;
- avoid the introduction and spread of invasive alien species;
- stop all hunting activities; and the killing and collection of protected or endangered species;
- avoid the use of explosives or toxic substances as a method for wildlife pest's control;
- prevent captivity of wildlife; and
- promote training programs to prevent and correctly respond to wildlife attacks in farms.

B.1. Sustainability Goal: Protection of natural environment

Outcomes	ID	Performance Indicators /Best practices
Natural ecosystems and protected areas are conserved.	B101	Operations identify all natural-ecosystems (according to the SAN Natural Ecosystems definition) and protected areas (as designated by local authorities) on or adjacent to the operation.
	B102	Operations do not destroy any natural ecosystems as of the initial engagement date with SAN programs, and onwards. Previous no-destruction periods can be defined for each operation based on risk conditions and available monitoring mechanisms.
	B103	Operations establish protection zones around all natural-ecosystems and protected areas, to prevent negative effects of the operation´s activities. Protection zones include buffer, riparian, or non-intervention areas.

Outcomes	ID	Performance Indicators /Best practices
Natural ecosystems and protected areas are conserved.	B104	Operations avoid the following activities with direct negative effects over natural ecosystems and nearby protected areas: – mining or soil removal; – deforestation and elimination of natural and native vegetation; – dumping solid waste or untreated wastewater over soils and water bodies, including water for washing agricultural facilities and stables; – dumping of hazardous waste (according to Annexes I and II of the 1992 Basel Convention) in soils and water bodies; – cattle grazing; – construction of impoundments; stream channelization; adding fill; extraction of aggregates for construction industry; or in any other way changing the depth or flow direction of a water body; – draining or drying of aquatic ecosystems through filling, excessive water withdrawal or other means; – pollution of aquatic ecosystems that significantly alters their natural chemistry or species composition; and – application of agrochemicals or fire, except for the control of invasive plant species or restoration purposes, and only if allowed by applicable legislation and the competent authorities..
Operations maintain and restore non-crop vegetation within their scope.	B105	Operations maintain existing non-crop canopy cover and vegetation cover in non-productive areas.
	B106	Operations restore degraded or contaminated natural ecosystems towards their original natural state.
	B107	Operations incorporate non-crop native vegetation around housing and infrastructure, and along protection zones, natural ecosystems, and protected areas, such as border plantings and barriers, live fences, shade trees, and permanent agroforestry systems.
	B108	Operations maintain and protect large non-crop trees, unless such trees pose a direct threat to people's and infrastructure's safety.
	B109	Operations maintain or increase the number of native shade tree species compatible with their productive systems and geographic region.

B.2. Sustainability goal: Protection of biodiversity

Outcomes	ID	Performance Indicators /Best practices
Wildlife (native plants and animals) is conserved.	B201	Operations implement routine monitoring protocols to follow up on wildlife status and the way it is affected by the operations' activities.
	B202	Operations prevent the collection of protected or endangered species (as defined by IUCN and applicable legislation) within their limits and their surroundings, except in the following scenarios and if compliant with applicable legislation: - plants used for non-commercial traditional medicinal use, when extraction does not affect the long-term viability of their populations; or - plants and wildlife collected for conservation efforts and scientific research.
	B203	Operations do not intentionally introduce or release alien invasive plants or animals (as defined by IUCN or applicable legislation) within the farm and its proximities; and take measures to contain and reduce invasive plants and wildlife already present within their limits.
	B204	Operations do not permit hunting and intentional killing of wildlife within their properties' limits and install signals, fences and/or surveillance systems to prevent these actions in their scope.
	B205	Operations inform and sensitize workers and local communities about biodiversity conservation and protection efforts and their importance.
	B206	Operations do not kill nor remove native vertebrates, unless: - they are considered as pest species and control measures are included as part of their IPM as a last resource; or - used for subsistence fishing activities.
	B207	Operations do not use explosives nor toxic substances for fishing or wildlife pest control, except for cases of rodent control.
	B208	Operations do not keep wildlife in captivity. If operations already have captive animals: - animals can be kept if: a) operations are granted a permission from competent authorities, b) animals are not held for commercial purposes, and c) animals are not mistreated; and - animals are not released or removed without supervision and permission from competent authorities.
	B209	Operations train workers in emergency response protocols for addressing wildlife attacks to people or crop/production damage.

B.3. Pollinator "friendly" agriculture

Pollinators –a wide variety of insects, birds, and mammals– are key elements for the conservation of natural ecosystems and the stability and enhancement of agricultural production. They have a fundamental role in the preservation of the relationships between the plants and animals that maintain basic ecosystem services and establish biological structures resilient to the effects of climate change.

Around 90% of flowering plants depend, directly or indirectly, on animal pollination to guarantee their reproduction. Wild pollinators ensure the optimum functioning and improvement of the ecosystem services offered by plant communities, such as the provision of food and shelter, the release of oxygen and carbon capture, and various functions in the water, carbon, and nitrogen cycles.

Pollination-dependent crops contribute to 35% of the global crop production volume, and more than three-quarters of the leading types of global food crops rely to some extent on animal pollinators to guarantee good yields and product quality. Because of the varying degrees in of pollination dependency, around 5% to 8% of crop production can be directly attributed to animal pollinators, with an annual market value ranging from US$235 billion to US$577 billion (IPBES, 2016).

Protecting native pollinator populations is not only economically important, but also contributes to food safety, better livelihoods, environmental conservation, and sustainable use of biological diversity (CBD, 2016). Among pollinator-dependent crops are numerous plants that are part of a healthy and nutritive diet (fruits, vegetables, cereals, seeds, nuts, and oilseeds).

SAN approach is based on offering solutions for production systems that reduce the pressure of agriculture and livestock on the natural populations of pollinator insects, birds, and mammals, while favoring their recovery, by proposing the implementation of best practices specifically addressed at protecting native pollinator populations and enhancing ecosystem services; and that are complemented by a series of other best practices for soils, water, ecosystem, and pest control management.

With the support both from local SAN technical specialists and the Oregon Integrated Plant Protection Center, SAN establishes the scientific foundations for each intervention and designs specific intervention strategies based on a participatory approach to determine the best practices for the conservation and restoration of pollinator populations.

B.3.1. Sustainability goal: Protection of pollinator biodiversity

Outcomes	ID	Performance Indicators /Best practices
Wild pollinator habitats are protected.	B301	Operations identify the different pollinator species (insects, birds and/or mammals) present on their farms and surrounding areas, specifying those species that are important for their crops and pasture/forage pollination.
	B302	Operations avoid contamination or reduction of habitats, food sources and water provision of pollinators during their different development stages.
	B303	Operations learn about the life cycle of the main pollinator species that have their habitat in or near the farm, or that are important for their production activities, to avoid agricultural practices that can negatively affect pollinator populations.
	B304	Operations control invasive alien species (plants or animals) that can negatively affect natural pollinators' populations due to competition for resources, toxicity, or predatory relationships.
	B305	Operations protect local pollinator populations through: - keeping non-crop areas within the farm landscape, such as flower strips, grasslands, buffer strips, native hedgerows, or fallow lands; - providing shelter, breeding, and nesting places or resources (natural o artificial materials); - implementing bare ground and low till practices for soil nesters; - planting of mass-flowering crops and blooming management (so flowers are available during long periods year-round); - planting of host plants for the immature stages of the pollinator species; and - diversifying productive systems to enhance diversity (number of kinds) and abundance (size of populations) of pollinators.
Introduced pollination services are responsibly managed.	B306	Operations implement cultural practices to prevent health, nutrition, and stress problems to introduced pollinators, and prevent the spread of pests.
	B307	Operations implement cultural practices to prevent pest propagations from introduced pollinators into natural pollinator populations, including the spread of virus, bacteria, fungi, protozoa, insects, parasitic mites, and predators.
	B308	Operations demonstrate that the number of introduced pollinators per area does not affect the provision of food, water, or shelter to the native pollinators' population.
	B309	Operations ensure that selection and management practices for introduced pollinators prevent their hybridization with wild pollinator populations

Conservation and management of natural resources

C. Conservation and management of natural resources

Natural resources, especially water and soil, are essential for the function and structure of agricultural production systems and for the overall social and environmental sustainability.

Agriculture accounts for roughly 70% of total freshwater withdrawals globally. Most of this freshwater is used by agriculture operations in Least Developed Countries (FAO, 2011). Farming also contributes to water pollution from nutrient and pesticide run-off and soil erosion. Without improved efficiency measures, agricultural water consumption is expected to rise by about 20% globally by 2050 (WWAP, 2012). With increased pressure from urbanization and industrialization, agriculture will face more competition for scarce water resources. Additionally, climate change is already affecting water supply and agriculture through changes in the seasonal timing of rainfall and snowpack melt, as well as with higher occurrence and severity of droughts, floods, and fires.

As the supply of healthy and productive land decreases and the population grows, competition is also intensifying for land and soil resources. One-third of the planet's land is severely degraded and fertile soil is being lost at the rate of 24 billion tons a year because of bad farming practices, such as heavy tilling, multiple sequential harvests, and abundant use of agrochemicals (UNCCD, 2017).

An increase of agricultural productivity and agricultural goods nutrition quality can help push progress towards future food security and the general wellbeing of producers and rural communities globally but given the limited natural resource base on which agriculture and livestock depend, sustainable development will ultimately depend on the responsible management of the planet's natural resources.

SAN's approach to a sustainable use of natural resources proposes a series of good practices to help reduce agriculture's pressure on natural resources and build more efficient and resilient production systems, which includes:

- encouraging the protection and restoration of water sources, and promote water use optimization;
- supporting the implementation of systems for wastewater treatment before reuse or disposal;
- fostering soil conservation and improved carbon stocks; and
- promoting waste reduction, recycling, and responsible disposal.

C.1. Sustainability goal: Soil restoration and management

Outcomes	ID	Performance Indicators /Best practices
Agricultural practices do not degrade the soil and enhance its condition.	C101	Operations only grow crops and graze livestock where soils are proven to be suitable for that crop, and in rotations or with intercrops when feasible.
	C102	Operations identify and map the soil types present within the farm, and the areas that are affected by or susceptible to erosion.
	C103	Operations minimize the risk of contamination or depletion of soils within their scope and related to their activities, including the management of soil exhaustion risks.
	C104	Operations implement practices to minimize soil erosion, including: - ground covers; - mulches; - re-vegetation of steep areas; - terracing, contour farming; - strip-cropping; - sediment control basins; - filter strips; and/or - minimization of herbicide use.
	C105	Operations design and install drainage systems to divert water away from vulnerable areas and drains to run across slopes.
	C106	Operations intercept and retain sediments from drainage systems and return them back to the field.
	C107	Operations implement practices to reduce soil compaction. All sites with evidence of soil compaction are subject to control measures.
	C108	Operations implement practices to maintain or enhance soil condition, including: - crop rotation; - planting of nitrogen-fixing ground covers or cover crops; - application of compost or mulch; - application of green manures; and - minimized tillage.
	C109	Operations increase and manage soil carbon (organic matter) by using organic fertilizers and amendments, and low toxicity substances.

Outcomes	ID	Performance Indicators /Best practices
Agricultural practices conserve the soil and enhance its condition.	C110	Operations use fire for virus control purposes only as a last resort measure. If fire is used for virus control: – it is prescribed by a competent professional and included as part of the IPM Plan; – it is applied only by trained workers that are provided with fire suppression tools and PPE[4]; – it is applied only when wind speed and direction create minimal risk of uncontrolled burning; – fire use areas and history are indicated on updated farm maps; and – additional soil and biodiversity restoration measures are implemented.
	C111	Sugar cane operations do not practice pre-harvest field burning. Feasible alternatives are green-harvesting and mechanized harvesting.
	C112	Operations do not dump solid or hazardous waste streams (according to Annexes I and II of the 1992 Basel Convention) on soils.
	C113	Operations implement practices to increase and maintain soil biodiversity, such as: establishing buffer strips, small fields, and contour strip cropping; regular crop rotation; varying of tillage practices; and increasing plant diversity.
	C114	Operations annually monitor their soil conditions to determine changes in structure, nutrient content, organic matter content and erosion evidence.
Agricultural practices optimize the nutrient balance in the soils.	C115	Operations implement nutrition management practices based on the assessment of crop and pasture needs, soil fertility and environmental conditions.
	C116	Operations use fertilizer application mechanisms that maximize nutrient availability to crops and pastures and minimize lixiviation and soil fixation losses.
	C117	Operations calibrate equipment for mixing and applying fertilizers: - as specified in the equipment and products' application manual; - whenever there are changes of physical state of the product (i.e., liquid, solid and/or emulsion); and - after maintenance activities.
	C118	If cover crops are planted, operations select the species, location, and seasonality of these plantings to minimize crop/pasture competition for water or nutrients and prioritize the use of native species.

[4] *See the definition of Personal Protective Equipment on Section IV: SAN Technical Concepts*

C.2. Sustainability goal: Water conservation

Outcomes	ID	Performance Indicators /Best practices
All water sources are protected.	C201	Operations identify and map all surface and ground water sources within their scope .
	C202	Operations implement actions to conserve and protect water sources from sedimentation, soil erosion and contamination.
	C203	Operations ensure that productive activities do not contaminate, degrade, or destroy water sources.
	C204	Operations demonstrate that water withdrawal complies with applicable legislation.
Water consumption is efficient.	C205	Operations implement a water conservation program[5] that includes: – water availability data (sources and volume); – current consumption records (volume and uses); – future water needs estimations (volume and uses); and – targets and actions for improving efficiency (including savings).
	C206	Operations diversify their water sources, including mechanisms for rainwater harvesting and storing.
	C207	Operations implement practices to conserve and retain soil moisture, such as: - establishment of ground covers; - application of organic mulches; and - crop and pasture grazing rotations.
	C208	Operations design and implement efficient irrigation systems, to optimize productivity, reduce water waste and avoid soil erosion and salinization.
	C209	Operations ensure that irrigation water is free of hazardous substances that can pose risk to soils, crops, human and environmental health.
	C210	Operations implement maintenance activities for all irrigation and water distribution systems (including irrigation by gravity channels), minimizing water losses due to leaks, broken pipes, valves that do not close properly and all other evidence of inefficient performance.
	C211	Operations implement actions to reduce tail water/runoff and store it.
	C212	Operations implement measures and procedures to optimize the use of water in processing plants, buildings, housing, agrochemical storage, and other infrastructure facilities, including the cleaning of equipment, machinery, and vehicles.

[5] A program is considered as a set of related measures or activities with a long-term aim

C.3. Sustainability goal: Responsible wastewater management

Outcomes	ID	Performance Indicators /Best practices
Wastewaters are managed to avoid environmental, human, or animal health risks.	C301	Operations ensure that all wastewater from processing operations, greywater, and sewage is treated to avoid negative effects to environmental and human health.
	C302	Operations demonstrate that wastewater discharges do not alter, destroy, or contaminate water sources, natural ecosystems, soil, crops, and vegetative covers; and are compliant with applicable legislation.
	C303	Operations do not use untreated sewage in production and/or processing activities.
	C304	Operations may use treated sewage for production activities of non-fresh consumption goods only if operations adapt or conduct a risk analysis for environmental and human health risks and implement the respective risk mitigation measures.
	C305	Operations design, site and manage wastewater treatment systems to minimize contamination and health risks, and in compliance with applicable legislation and health regulations.
	C306	Operations map all pit latrines, sewage drainages and wastewater disposal sites.
	C307	Operations use wastewater from processing operations and greywaters in irrigation or apply it to soil only if treated, and after demonstrating that it is chemical and biological characteristics do not pose a risk to environmental and human health.
	C308	Operations do not intentionally mix wastewaters with clean water for the purpose of diluting it before its discharge.
	C309	Operations safely store or reuse in production plots wastewater with agrochemical residues.
Wastewaters are managed to minimize environmental, human, or animal health risks.	C310	Operations do not discharge untreated wastewater with agrochemical residues to natural ecosystems.
	C311	Operations test wastewater with agrochemical residues prior to discharging it to ensure compliance with the parameters specified by applicable legislation.
	C312	Operations monitor service providers that are handling operations' wastewater to ensure their compliance with applicable legislation for safe wastewater treatment or disposal.

C.4. Sustainability goal: Responsible waste management

Outcomes	ID	Performance Indicators /Best practices
Waste is managed to minimize environmental, human, or animal health risks.	C401	Operations identify the type and amount of different waste streams produced within their activities' scope.
	C402	Operations implement a monitor mechanism for all waste management activities.
	C403	Operations minimize the purchase or use of inputs that generate waste.
	C404	Operations compost organic waste or use any other method to reintegrate it into their productive systems.
	C405	Operations utilize burning of waste as a treatment measure only if there are incinerators technically designed for the specific waste type and in compliance with applicable legislation.
	C406	Operations store, treat and dispose waste in a way that does not pose risks to environmental and human health.
	C407	Operations keep infrastructure clean and free of waste accumulations that can attract disease vectors and other pests.
	C408	Operations reduce the volume of hazardous waste streams (according to Annexes I and II of the 1992 Basel Convention)[6].
	C409	Operations comply with applicable legislation about handling and final disposal of hazardous waste streams.
	C410	Operations store prohibited, obsolete and expired hazardous substances (including agrochemicals) until safely returned to the supplier. If suppliers do not receive such substances back, operations label the containers, and store them separately in dedicated safe areas or sealed pits for their disposal.
Service providers are monitored for correct waste management.	C411	Operations evaluate if service providers minimize waste generation and receive back the used packaging and empty containers of hazardous substances.
	C412	Operations implement mechanisms to monitor service providers and ensure that they comply with the applicable legislation and other requirements to safely dispose the waste handled over from operations.

[6] *See the definition of Hazardous substance in Section IV: SAN Technical Concepts*

Crop protection and agrochemicals management

D. Crop protection and agrochemicals management

The global demand for food and agriculture will continue to grow, and this represents a significant challenge for the sustainable agriculture supply. While pesticides and fertilizers application play a vital role in increasing agricultural production and ensuring the supply of agricultural products, their misuse leads to the degradation of soil and water resources, and air pollution, with serious negative impacts over human and environmental health.

Total utilization rate of fertilizers and pesticides is usually low due to poor management of nutrient and crop protection practices, which means that a good portion of the applied substances end up contaminating the soil, water, and air. Groundwater resources worldwide are being polluted by the agrochemical lixiviates, and all the nutrient leaching from agricultural land is causing the eutrophication of aquatic ecosystems.

But the effects of an increased use of agrochemicals[7] transcend their impact on the environment, as many producers in developing countries are experiencing short- and long-term health effects due to their exposure to hazardous chemicals, including chronic effects such as cancer, endocrine malfunctions, and birth defects.

SAN's approach to a responsible management of agrochemicals include a series of best practices to:

- optimize the use of agrochemicals and reduce the associated agricultural production costs;
- reduce and mitigate the negative effect of pesticide residues and fertilizers lixiviates on natural resources and air quality;
- avoid the negative effects of agrochemicals on farmers' and agricultural workers' health; and
- promote an IPM approach for crop protection activities.

Integrated Pest Management (IPM) approaches aim to protect crop and pasture health by combining different pest control methods, thus reducing the use of synthetic pesticides and the toxic footprint of agriculture. Pressure should only be exerted on those pests that can cause significant damage to crop and, therefore, negatively affect the profitability of production units, thus IPM approaches can also contribute to biodiversity protection within the scope of production systems and their area of influence.

[7] Agrochemicals broadly refer to all chemical substances used or added agricultural production including pesticides, fertilizers, veterinary drugs, and feed additives, among others.

The PAMS framework for IPM allows the design of pest management solutions for specific scenarios, considering all the different conditions that can be encountered within the production unit, and including practices for:

- **Prevention:** create optimum conditions within crop and pasture systems to prevent appearance of pests as a first measure.
- **Avoidance:** when a pest appears, measures are taken to avoid its spread.
- **Monitoring:** regular revision of pest behavior and environmental conditions that foster their growth and propagation, to take preventive measures and adjust them when necessary.
- **Suppression:** implement cultural practices and the use of low-toxicity substances to reduce or eliminate pests.

SAN adopts the PAMS framework and additionally implements IPM strategic planning through the participatory methodology designed by the Oregon Integrated Plant Protection Center (USA), based on the following steps:

1. Design the participatory process with key stakeholders. Producers, technicians, company representatives and specialized technical personnel participate in the intervention design, which facilitates the real and correct implementation of all the control measures that are proposed within each specific intervention, and their sustainability through time. This involves field visits, group analysis, decision making processes and other activities in accordance with the participants' characteristics.
2. Identification of productive processes and pest infestation risks. Critical needs and current management strategies are identified and analyzed.
3. Analysis of the biology and life cycle of identified pests. Focused analysis of each pest's characteristics to determine the best control measures (following the PAMS logic), with provisions for the later assessment of the measures' effectiveness.
4. Identification of areas and pests that require further control measures. The use of synthetic pesticides and other pest control substances is evaluated as a measure of last resort, including an analysis of the circumstances in which each substance can be used, proposing guidelines to be followed for their selection, and safe handling; and any additional measures to be taken to avoid or mitigate their negative impact on people and the environment.

D.1. Sustainability goal: Integrated pest management

Outcomes	ID	Performance Indicators /Best practices
Crop health is addressed through training, implementation and learning of Integrated Pest Management approaches.	D101	Operations implement Integrated Pest Management (IPM) practices as the first resource to manage the phytosanitary conditions of crops and pastures to ensure optimal productivity. Pest control actions aim to: - prevent the outbreak and spread of pests; - use cultural practices, biological agents, and low toxicity substances (such as organic solutions, plant extracts or derivatives, minerals, mineral salts, or derivatives) to control phytosanitary conditions; - optimize and reduce the number of synthetic pesticides; - monitor the presence of pests, the conditions under which they appear and spread, and the effect of the applied control measures; and - evaluate the pest control results; and use them to improve the overall pest management system.
	D102	Operations organize, schedule, and keep records of all IPM actions and practices implemented.
	D103	Operations train workers and farmers within their scope for the correct and safe implementation of IPM practices.
	D104	Operations keep records of pest infestations and analyze them to update IPM practices. Records include at minimum: - pest or disease agents; - periods of crop/pasture susceptibility; - environmental conditions during outbreak (weather, soil, light, unusual events); - infestation dates; - area and location; and - degree of damage and pest infestation trends.
	D105	Operations consider the use of fire for virus control purposes only as a last resort measure. If fire is used for pest control: - it is prescribed by a competent professional and included as part of the IPM Plan; - it is applied only by trained workers that are provided with fire suppression tools and PPE8; - it is applied only when wind speed and direction create minimal risk of uncontrolled burning; - fire use areas and history are indicated on updated farm maps; and - soil and biodiversity restoration measures are implemented after the use of fire.
	D106	Operations restore or plant areas as a refuge for beneficial organisms, such as a mixture of patches or stripes of perennial and annual flowering plants that serve as refuge, food source and reproduction sites for pollinating and pest-predating insects or vertebrates.

[8] *See the definition of Personal Protective Equipment on Section IV: SAN Technical Concepts*

D.2. Sustainability goal: Safe management of agrochemicals

Outcomes	ID	Performance Indicators /Best practices
Agrochemicals with low impact on human health and the environment are used.	D201	Operations use permitted pesticides only as part of an IPM plan.
	D202	Operations only use agrochemicals that are legally registered in the production country.
	D203	Operations do not use any of the substances considered as Highly Hazardous Pesticides (FAO/WHO Meeting on Pesticide Management).[9]
	D204	Operations only use agriculture mineral oils that contain less than 3% of Dimethyl Sulfoxide (DMSO) residues.
	D205	Operations practice the rotation of synthetic pesticides based on the application of different pesticide groups with different action modes, to prevent building pest resistance to active ingredients.
	D206	Personnel responsible of synthetic pesticide applications knows which products are permitted and which are prohibited.
Agrochemicals' handlers conduct their tasks safely.	D207	Operations do not allow children (minors of 18 years), pregnant or lactating women to handle synthetic pesticides.
	D208	Operations designate personnel responsible for authorizing agrochemical applications, and determine the type of product, dosage, and equipment type to be used.
	D209	Operations provide Personal Protective Equipment (PPE) [10] to all agrochemical handlers, according to each applied substance requirements.
	D210	Agrochemical handlers receive training on agrochemical management and demonstrate that they know how to correctly perform assigned tasks.
	D211	In case that workers for agrochemical applications are outsourced, operations implement mechanisms to monitor service providers and ensure that they comply with the local legislation to handle and apply agrochemicals safely.
Detailed and updated agrochemical use records are maintained	D212	Operations keep records of agrochemical applications. Records include information about products applied, time and location of application, dosages and volumes, the name of the persons who applied them, and the equipment used.
	D213	Operations demonstrate (through record keeping) a tendency to reduce the number and total volume of agrochemical applications to reduce the toxic load. Any increase in use is short-term, specific for a type of pest, and justified in technical and economic terms.

[9] For detailed lists of pesticides risk classification, see Jepson PC, Murray K, Bach O, Bonilla MA, Neumeister L. Selection of pesticides to reduce human and environmental health risks: a global guideline and minimum pesticides list. Lancet Planet Health 2019: 3: e56–63.

[10] *See the definition of Personal Protective Equipment on Section IV: SAN Technical Concepts*

Outcomes	ID	Performance Indicators /Best practices
The correct mixing of agrochemicals and management of its application equipment are ensured.	D214	Operations calibrate equipment for mixing and applying agrochemicals: - as specified in the equipment and products' application manual; whenever there are changes of physical state of the product (i.e., liquid, solid and/or emulsion); and - after maintenance activities.
	D215	Operations train agrochemical handlers on how to mix products and maintain/calibrate application equipment safely for correct and precise mixing of agrochemicals.
	D216	Operations keep records for application equipment maintenance, repairs, and calibration.
Agrochemicals are safely stored and handled to prevent any negative impact over human and environmental health.	D217	Operations store all agrochemicals in a safely locked storage facility; and allow access to those facilities only to personnel trained in safe handling and management of agrochemicals.
	D218	Operations store prohibited, obsolete and expired substances until safely returned to the supplier. If suppliers do not receive such substances back, operations label the containers, and store them separately in dedicated safe areas/sealed pits for the disposal of agrochemicals.
	D219	Operations keep storage areas for agrochemicals that are: – equipped and identified in accordance with the type of stored substances and materials; – clean and organized; – provided with sufficient artificial or natural light to enable work activities and to find the emergency exits; – provided with sufficient natural ventilation to avoid the accumulation of odors and vapors; – equipped with firefighting mechanisms and means to adequately remediate any spillage of hazardous substances or materials; and – equipped with emergency showers and eye-washing facilities in areas where hazardous substances are stored or mixed.
Empty agrochemical containers are safely stored and disposed to prevent any negative impact over human and environmental health.	D220	Operations ensure that empty pesticide containers and application equipment are triple washed, and the rinse water is returned to the application mix for re-application.
	D221	Operations store empty agrochemical containers in a locked storage area, until safely returned to the supplier. If suppliers do not receive empty containers, operations adopt safe disposal practices such as: triple wash and perforation to avoid their reuse, sequestration (landfills and pits); or destruction by high temperature incineration, base catalyzed dechlorinating, gas phase chemical reduction or plasma arc.
	D222	Operations re-use containers only for the original contents, and only when labeled accordingly.

D.3. Sustainability goal: Implementation of risk mitigation measures

Outcomes	ID	Performance Indicators /Best practices
Agrochemical applications' spray drift is minimized.	D301	Operations select optimum agrochemical application equipment and application techniques to optimize the agrochemical effect and to reduce spray drift.
	D302	Operations implement actions to prevent agrochemical spray drift to all natural-ecosystems and all human activity zones; actions include at minimum one of the two following mitigation mechanisms: a) implementation of non-application zones between these areas and the crops or pastures subject to agrochemical applications: • 5 meters, if applied by mechanical, hand-assisted and targeted application methods, such as for example knapsack sprayers, banding, baiting, specific granule placement, soil or plant injection, seed treatments and weed wiping; • 10 meters, if applied by broadcast or pressurized spray application methods, such as: motorized sprayers or spray booms, air blast sprayers, foggers (Ultra Low Volume fogging machines); b) establishment of functional vegetative barriers that are: • as high as the crop height or the height of terrestrial equipment's application valves over the ground, whichever is higher; • composed of plants that maintain their foliage all year, but which are permeable to airflow, allowing the barrier to capture pesticide drops; • composed preferably of native species. c) use of precision technologies, such as localized applications.
Measures are implemented to mitigate the impact of agrochemical applications over human and environmental health.	D303	Operations prevent the access of people to pesticide application areas by implementing Restricted Entry Intervals (REI) as stipulated in the product's MSDS, label o security tag, whichever is more stringent. When two or more products with different REIs are used at the same time, operations apply the longest interval.
	D304	Operations take actions to effectively reduce the amount of agrochemical residues in the water of drainage canals.
	D305	Operations identify, alert, and warn potentially affected persons or communities about pesticide applications.

D.4. Sustainability goal: Controlled use of hazardous pesticides

Outcomes	ID	Performance Indicators /Best practices
Risk mitigation measures are implemented for the use of hazardous pesticides.	D401	Operations use substances listed in the SAN List of Risk Mitigation Pesticides, only if the specific SAN recommended risk mitigation measures are applied. This includes substances with risks to aquatic and terrestrial wildlife, risks to insect pollinators, reproductive toxicity, and inhalation risk.
	D402	Operations may apply substances listed in the SAN List of Risk Mitigation Pesticides as having risks for pollinators only if: a) less toxic, efficacious pesticides are not available; b) exposure of natural ecosystems to pesticides is minimized by establishing non-application zones or functional vegetative barriers; and c) contact of pollinators with these substances is further reduced: • substances are only applied after 5 pm to avoid pollinator peak activity hours • substances are not applied to flowering weeds or flowering weeds are removed; and • substances are applied while the crop is not in peak flowering period.
	D403	Operations apply substances listed in the SAN List of Risk Mitigation Pesticides as having inhalation risks, only if: - restricted entry intervals are enforced; and - respirators with an organic vapor (OV) cartridge or canister with any N, R, P, or 100 series pre-filter are used; and - all application sites are flagged to indicate inhalation risks to bystanders.

Outcomes	ID	Performance Indicators /Best practices
Risk mitigation measures are implemented for the use of hazardous pesticides.	D404	When less toxic, efficacious pesticides are not available; operations apply the seven substances categorized as GHS repro 1A/1B (Pesticide active ingredients and their formulations that meet the criteria of reproductive toxicity Categories 1A and 1B of the Globally Harmonized System on Classification and Labelling of Chemicals) Borax, Boric acid, Carbendazim, Epoxiconazole, Glufosinate-ammonium, Quizalofop-p-tefuryl and Tridemorph; only if the following reproductive toxicity risk management requirements are fully implemented: a) the listed reproductive toxicity substances are rotated with lower toxicity substances as part of the rotation for resistance management; b) environmental risks of pesticide applications are mitigated; c) substance handlers use higher level PPE[11] to avoid skin exposure (according to pesticide label indications); d) substance handlers are provided with medical examinations, clearly specified as part of an Occupational Health and Safety plan; e) operations implement Restricted Entry Intervals (REI) according the product's MSDS, label or security tag. When two or more products with different REIs are used at the same time, the longest interval applies; f) operations establish and maintain non-crop vegetative barriers or non-application zones between pesticides applied crops and areas of human activity; and g) potentially affected persons or communities are identified, alerted, and warned about applications and prevented from access to application areas.

[11] *See the definition of Personal Protective Equipment on Section IV: SAN Technical Concepts*

Outcomes	ID	Performance Indicators /Best practices
Risk mitigation measures are implemented for the use of hazardous pesticides.	D405	Operations use the nematicides cadusafos, ethoprop, fenamiphos, oxamyl and terbufos, only if the following nematicide risk management requirements are fully implemented: a) lower toxicity nematicides are used as part of the rotation for nematicides resistance management; b) application methods place the product precisely within the plant root zone or use tree injection, uncovered application of granules is prohibited; c) daily maximum application time is limited to eight hours divided into two shifts with bathing to wash off residues from the pesticide handler in between them; d) application is conducted during the coolest hours of the day; e) annual medical monitoring of applicator health (kidney and liver function) is provided; and f) cholinesterase levels of pesticide (nematicide) handlers are tested. Tests are conducted prior to the first-time workers apply these substances on the farm and periodically thereafter if they remain assigned to this task. Other work that does not involve use of these five substances is offered to those organophosphate or carbamate pesticide handlers with results outside of the accepted cholinesterase levels.
	D406	Operations apply substances listed in the SAN List of Risk Mitigation Pesticides as having risk to aquatic life and terrestrial wildlife, only if effective mechanisms to reduce spray drift towards their habitats (aquatic and terrestrial ecosystems) are implemented, including: a) establishment of non-application zones between these areas and the applied crops: – 5 meters, if applied by mechanical, hand-assisted, and targeted application methods, such as knapsack sprayers, banding, baiting, specific granule placement, soil or plant injection, seed treatments and weed wiping; – 10 meters, if applied by broadcast or pressurized spray application methods, such as: motorized sprayers or spray booms, air blast sprayers, foggers (Ultra Low Volume fogging machines), depending on the equipment's technical specifications; and b) establishment of functional vegetative barriers that are: – as high as the crop height or the height of the terrestrial equipment's application valves over the ground, whichever is higher; – composed of plants that maintain their foliage all year, but which are permeable to airflow, allowing the barrier to capture pesticide drops; and – composed preferably of native species.

Outcomes	ID	Performance Indicators /Best practices
Risk mitigation measures are implemented for the use of hazardous pesticides.	D407	Operations may use rodenticides (brodifacoum, bromadiolone, bromethalin, chlorophacinone, coumatetralyl, difethialone, diphacinone, flocoumafen, strychnine, warfarin, and zinc phosphide), only if the following rodenticide risk management requirements are fully implemented: a) rodenticide traps are only used if rodent monitoring demonstrates that mechanical control methods are not effective; b) only formulated rodenticide baited traps are used; c) signs of rodent activity (droppings, tracks, gnaw marks, burrows) are monitored and the results recorded. Traps are inspected daily and bait stations and installations weekly; d) bait stations are tamper-resistant, anchored, and constructed in such a manner and size as to permit only the entrance of rodents; e) food sources attracting rodents and debris are eliminated; f) rodent carcasses are handled with gloves and buried in locations that do not pose risk to human health or water contamination; and g) bait stations are removed, and the number of stations diminished when there are no longer signs of rodent feeding or there is evidence of use by non-target wildlife.

Protection of workers' rights

E. Protection of workers' rights

Agriculture is an important source of employment and income, particularly in developing countries and rural areas. It employs almost one-third of the global labor force and two-thirds of the world's poor (ILO, 2017; ILOStat, 2017). Despite the heterogeneity of agricultural activities around the globe, some features are common between geographies and production systems. Agricultural workers often face deficits of available decent work, regularly receiving low wages and incomes for tasks that are performed in poor and even hazardous conditions (ILO, 2014a). Workers also have very few resources available for protection and compensation in terms of access to health care, wages, and income, insurance, and benefits (FAO, 2016a; FAO, ILO & IUF, 2007).

Creating optimum employment opportunities within agriculture and livestock is an essential driver for rural development and for more equitable and inclusive societies (FAO & ILO, 2010). Income inequalities and the lack of optimum working conditions adversely affect the contribution of the agricultural sector towards the reduction of rural poverty and achieving sustainable development. It also has a negative impact in terms of productivity, as human capital in rural areas –which is indispensable for the success of agricultural endeavors– suffers from significant erosion (FAO, & ILO, 2010; ILO, 2013).

SAN's vision of decent work conditions for agricultural workers is based on the provisions of international and local labor legislation, to ensure respect for human and labor rights by encouraging work opportunities that provide fair income; workplace security; freedom for workers to express their concerns, organize and actively participate in the decisions that affect their lives; and equal opportunities and treatment for all women and men. To achieve that vision, SAN offers a set of practical requirements and recommendations that guide the agricultural sector towards the creation of decent work conditions and the eradication of:

- forced, compulsory and slave labour;
- discrimination and harassment at the workplace;
- the worst forms of child labour;
- the use of any arrangements or mechanisms designed to eliminate or reduce pay and benefits due to workers; and
- any other labor practices that invalidate or harm equality of opportunity or treatment in employment, including equal pay for men and women for work of equal value.

SAN's approach also encourages:

- the regulation and supervision of young workers' conditions;
- the respect and support for the workers' right to establish and join workers' organizations of their own free choice;
- the establishment of grievance mechanisms to receive and follow up on workers complaints;
- the regulation of working hours, rest periods and vacation benefits according to international and local standards; and
- the payment of at least the legal minimum wage or the wage negotiated collectively.

E.1. Sustainability goals: General compliance with applicable legislation

Outcomes	ID	Performance Indicators /Best practices
All workers receive the rights and benefits covered by applicable legislation	E101	Operations comply with all applicable labor legislation and demonstrate compliance with legal labor requirements.
	E102	Operations only work with service providers and hiring-intermediaries that have all licenses and legal permits for their operations, can provide evidence of compliance with applicable legislation, and can provide a list of the full recruited workforce and their correspondent labor agreements.
	E103	Operations keep records of all hired workers, including basic information (worker's name, gender, hire date, and age), working conditions (job type or description of tasks, number of regular working hours per period, and their gross and net pay for regularly worked hours, or the agreed pay rate), and labor agreement (signed or marked by the worker).
	E104	Operations implement hiring practices that grant all legal labor benefits (regarding working conditions, compensation, schedule and provided infrastructure) to all their workers. Short-term hiring and firing to avoid legal benefits are not practiced.
	E105	Workers have been informed and are aware of their rights and of the operations' mechanisms to comply with applicable labor legislation.
	E106	Operations have written labor agreements with workers, compliant with applicable legislation and including job description; working hours and overtime regulations; pay rate, benefits, and deductions; annual paid vacation leave; protection from loss of pay in the case of illness, disability, or accident; sanction and grievance procedures, collective bargaining agreements (where implemented); and notice period for contract termination.
	E107	Smallholder operations can use verbal agreements with workers if permitted by applicable legislation and always in compliance with the conditions established by the relevant regulations and authorities.

E.2. Sustainability goal: No-forced labor

Outcomes	ID	Performance Indicators /Best practices
All workers receive all the rights and benefits afforded by the Forced Labor Convention, 1930 (No.29), the Abolition of Forced Labour Convention, 1957 (No. 105) and the Protocol of 2014 to the Forced Labour Convention, 1930 (P029).	E201	Operations do not engage in forced, compulsory or slave labor, covering all situations in which persons are coerced to work through use of violence or intimidation, or by more subtle means such as accumulated debt, retention of identity papers or threats of denunciation to immigration authorities.
	E202	Operations have recruitment processes that: – are compliant with applicable legislation; – do not require retention of workers documents (such as work permits, passports, and IDs); – do not require workers to pay recruitment fees; and – demonstrate that workers are not indebted or coerced to work.
	E203	Operations maintain personal records of all their workers, both hired directly and through intermediaries. Records include basic information about each worker and their working conditions and labor agreements, such as personal information, wages, contracts, and employment time.
	E204	Operations do not force workers to work or stay at the workplace, such as security mechanisms, armed guards, threatening gestures or signs, or financial loans. Labor agreements do not contain clauses that restrict free movement of workers, retention of documents or unjustified wage deductions.
	E205	Operations document all money or benefit retentions applied to workers and demonstrate that such retentions comply with applicable legislation and the established labor agreements.
	E206	Operations' human resource procedures and sanction systems do not include compulsory work or extra hours; restrictions on free movement; physical or psychological punishment; fines or illegal deductions from wages; nor control of worker access to food, water, toilets, canteens, medical care, health clinics or their homes.
	E207	Labor by soldiers or prisoners or those working under the regimen of imprisonment, is prohibited, even when permitted by local regulations or other legislation.

E.3. Sustainability goal: Discrimination and harassment-free work environments

Outcomes	ID	Performance Indicators /Best practices
All workers receive all the rights and benefits afforded by the Discrimination Convention, 1958 (No.111) and the Equal Remuneration Convention, 1951 (No. 100).	E301	Operations do not engage in any form of discrimination during labor hiring, training, task assignment, labor benefits assignment, workplace promotions; and other activities that may offer opportunities for better conditions, pay, or advancement to workers.
	E302	Operations treat all workers with respect and clearly communicate their policies for a discrimination and harassment free workplace.
	E303	Operations do not make distinction, exclusion, or preference to invalidate or harm equality of opportunity or treatment in employment, working conditions and payments, based on the workers': - ethnicity, color, gender, sexual orientation, tribe, caste, religion, political opinion, national extraction, or social origin; - nationality or migratory status; - civil status; - present or future medical conditions; - family condition, including pregnant women and parents with children, or any other protected status as included in applicable legislation; - affiliation or membership to a worker's organization; - history of having filed complaints within established grievance mechanisms.
	E304	Operations base their recruitment procedures solely in the competences and skills required for the position being filled.
	E305	Operations provide temporary and part-time workers (both national and foreign) with all rights and benefits as defined by applicable legislation.
	E306	Operations protect vulnerable people or groups, and encourage respect between workers, by mechanisms such as gender committees and training activities.
	E307	Operations do not allow nor promote any of the following conducts between their workers: threats or rewards to solicit sexual favors; sexual advances; sexual comments offensive to the receptor; insults based on the worker's gender; or display of sexual material or gestures.
	E308	Operations implement a documented grievance system to receive discrimination and harassment related complaints. The grievance system includes mechanisms to receive and investigate reports of potential discrimination and harassment situations, and corrective actions and sanctions to deal with such cases. The grievance system also allows workers to contact external organizations, when they experience that internal mechanisms are not effective.

Outcomes	ID	Performance Indicators /Best practices
All workers receive all the rights and benefits afforded by the Discrimination Convention, 1958 (No.111) and the Equal Remuneration Convention, 1951 (No. 100).	E309	Operations address the specific requirements of women for maternity leave and breastfeeding; and assign women to tasks that are not harmful to their health and/or the health of their children.
	E310	Workers confirm that they are not subject to threats, intimidation, sexual abuse, or harassment, nor verbal, physical, or psychological mistreatment within the operation.
	E311	Workers are familiar with and understand the operations' policies and actions to encourage respect in the workplace; and can demonstrate how to apply this knowledge into their routine activities.

E.4. Sustainability goal: Workers' freedom of association

Outcomes	ID	Performance Indicators /Best practices
All workers receive all the rights and benefits afforded by the Freedom of Association Convention, 1948 (No.87) and the Right to Organize and Collective Bargaining Convention, 1949 (No. 98).	E401	Operations respect and support the workers' right to establish and join workers' organizations of their own free choice.
	E402	Operations inform existing and new workers about available workers' organizations for them to join, and do not impede in any way workers from joining or forming organizations or having contact with other groups to be informed of their organizing rights and alternatives.
	E403	Operations and workers' organizations do not force workers to join the organizations. Enrollment is always voluntary.
	E404	Operations facilitate the workers' organization activities, including free access of the organization's representatives to the operations' properties, allowing workers to freely participate in workers' organizations activities and allowing workers' communications with their representatives regarding their working conditions.
	E405	When the number of employees is less than the minimum required by law to create a worker organization, operations implement other effective mechanisms between workers and the operations' management to negotiate on workers' rights and conditions.
	E406	Workers are familiar with workers' organization and their work and confirm that they can freely exercise their right to organize or collectively negotiate their working conditions with the operations' administration.
	E407	Workers' representatives confirm they can perform their tasks freely, without restrictions or influence of the operations' administration.

E.5. Sustainability goal: No-child labor and regulation of young workers.

Outcomes	ID	Performance Indicators /Best practices
Children under 15 years are not hired, and all worst forms of child labor are eradicated; according to ILO's Minimum Age Convention, 1973 (No.138) and Worst Forms of Child Labor Convention, 1999 (No. 182).	E501	Operations do not allow children (minors under 15) as workers within their activities scope, nor allow them to perform tasks in exchange for in-kind payments.
	E502	Operations do not allow minors (younger than 18 years) to be engaged in any of the following worst forms of child labor: - all forms of forced compulsory or slave labor; - debt bondage and serfdom; - sale and trafficking of children; - use, procuring or offering of a child for prostitution, to produce pornography or for pornographic performances; - use, procuring or offering of a child for other illicit activities; - work which, by its nature or the circumstances in which it is carried out, is likely to harm the health, safety, or morals of children; including: • handling of pesticides, hazardous substances, or residues; • operating, assisting to operate, or cleaning power machinery or dangerous tools; • activities requiring physical exertion beyond the child's safe capacity, such as heavy lifting of loads heavier than 20% of a minor's body weight; • work on steep slopes of more than 50%, near cliffs or drop-offs, or on roofs or ladders; • work in storage areas, silos, and construction sites; and • night work.
All workers receive all the rights and benefits afforded by the Freedom of Association Convention, 1948 (No.87) and the Right to Organize and Collective Bargaining Convention, 1949 (No. 98).	E503	Operations do not allow nor requests that children from the operations' management and workers, carry out activities to assist their parents in their work.
	E504	Operations take a proactive approach towards preventing child labor and take into consideration the inputs of communities and minors to develop a system to prevent and remediate child labor.
	E505	Children may participate in tasks that are traditional to children in the operations' region and that are undertaken for the purpose of transmission of the family's or local culture. In such cases, children are always supervised by an adult member of their family, and tasks do not deprive them from their fundamental rights (education, health, integrity, and safety).

Outcomes	ID	Performance Indicators /Best practices
Young workers' conditions are regulated according to the Minimum Age Convention, 1973 (No.138) and Worst Forms of Child Labor Convention, 1999 (No. 182).	E506	If permitted by local legislation, operations may hire young workers (minors between 15 and 17 years old) as long as operations: – demonstrate compliance with all related legal requirements; – do not contravene any of the dispositions about child labor and work harmful for children; – implement specific procedures for the hiring of young workers; – assure that young workers' work schedule allows them to attend legally compulsory school activities/lessons; and – assure that young workers' schedules do not exceed 8 hours a day, and 48 hours a week, and do not work extra-time; allowing them a minimum consecutive period of 12 hours' overnight rest, and at least one full day of rest for every six consecutive days worked.
	E507	Operations use and can provide reliable sources of information or official documents to determine the age of the workers, such as: birth certificate, passport, school certificate, vaccination cards or other public health records with birthdate; or baptismal or other church/religious institution's record/document with birthdate.
	E508	Operations train young workers in the competences necessary to perform their tasks safely.
	E509	Young workers confirm that they are aware of the terms of their labor agreements, that they know how to safely perform their tasks and that they have received training in how to reduce risks and prevent accidents.

E.6. Sustainability goal: Fair salaries and wages

Outcomes	ID	Performance Indicators /Best practices
All workers receive at least the minimum wage afforded by applicable legislation and labor regulations.	E601	Operations pay the legal minimum wage, or the wage negotiated collectively, whichever is higher, to all their workers. In cases where workers are paid by piece or quota, operations establish a pay rate that allows workers to earn at least the legal minimum wage for a 48-hour standard working week.
	E602	Operations include in-kind payments as part of the minimum wage only if permitted by applicable legislation and never exceeding 30% of it.
	E603	Upon hiring, operations explain all payment reductions that are not legally required (such as housing, food, or other services) and get consent from the worker to make such deductions.
	E604	Operations do not charge workers nor deduct from their payment the costs of tools, equipment and gear required to perform their assigned tasks.
	E605	Operations implement payment policies and procedures for paying all wages and benefits such as bonuses and special expenses, on time and in full; and provide workers with payment receipts that detail applicable in-kind portions and any deduction or retention.
	E606	Workers are familiar with payment policies and procedures and understand and agree with the applicable deductions to their salaries.

E.7. Sustainability goal: Existence of grievance mechanisms

Outcomes	ID	Performance Indicators /Best practices
All workers have access to grievance mechanisms at the workplace.	E701	Operations implement a documented grievance system to receive workers' complaints. The grievance system includes mechanisms to receive and investigate reports of potential violations of workers' rights, and corrective actions and sanctions to deal with such cases. The grievance system also allows workers to contact external organizations in general, or when they experience that internal mechanisms are not effective.
	E702	Operations allow workers the right to object the received payment when they do not agree with calculations or the contents of the labor agreement. Operations review the objections, and document the decisions made.
	E703	Operations do not subject workers that use the grievance mechanisms to employment termination, retribution penalties nor threats.

E.8. Sustainability goal: Regulation of working hours and vacation time.

Outcomes	ID	Performance Indicators /Best practices
All workers receive all the rights and benefits afforded by applicable legislation regarding working hours and vacation time.	E801	Operations ensure that regular working hours for all workers do not exceed 48 hours per week on average, with the calendar year as a basis for calculation.
	E802	Operations allow workers at least one meal period for every six hours worked; and one full day of rest for every six consecutive days of work, or two full days of rest for every twelve consecutive days of work.
	E803	Operations have a clear overtime policy for different positions, tasks, or jobs; and do not force workers to work additional hours. All overtime is voluntary.
	E804	Operations pay all overtime at the rate required by applicable legislation, or as collectively negotiated: whichever rate is higher. In absence of applicable legislation and collective agreements for overtime payment, operations pay all overtime at 1.5 times the regular wage level.
	E805	In the case of management positions and security guards, operations can apply an exception to the above regulations if permitted by local applicable legislation.
	E806	Permitted exception periods are applied by operations only when not prohibited by applicable legislation, and when they face the following situations: – possible loss of harvest, in the case of perishable fruits, vegetables, flowers and ornamental plants; or – imminent risk of loss or damage of infrastructure, machines, cattle or crop plants.
	E807	If operations apply exception periods (as defined above): – workers may work maximum 56 hours of work per week on average (during the exception period), with the calendar year as a basis for calculation; – workers may work maximum 10 hours of work per day on average, with the length of the exception period as a basis for calculation; and – operations take measures to reduce accident rates during overtime work periods, if these are higher than during periods of regular work hours.
	E808	Operations grant at least two weeks of paid vacation leave per year to all workers. This is equivalent to 10 days based on a five-day work week, or 12 days based on a six-day work week, with pro-rating for part-time and seasonal workers.

E.9. Sustainability goal: Gender equality

Outcomes	ID	Performance Indicators /Best practices
There is gender equality at the workplace.	E901	Operations do not engage in labor practices that invalidate or harm equality of opportunity or treatment in employment, based on gender-related reasons, including equal pay for men and women for work of equal value.
	E902	Operations include pregnancy tests or questions about pregnancy upon hiring only with the objective to protect the health of the woman or fetus/embryo/newborn, and without discriminatory consequences.
	E903	Operations encourage women to work as supervisors, at administrative and management level, to participate in leadership positions, and to participate in decision-making processes according to the operation's governance system.
	E904	Operations contact and encourage women – including those in remote areas, those without transportation, or those with limited literacy or language skills – to participate in training and support activities.
	E905	Operations base their recruitment procedures solely in the competences and skills required for the position being filled.
	E906	Operations support and facilitate their workers equal access to products and services.
	E907	Operations provide pregnant women at least twelve weeks of fully paid maternity leave, with at least six of those weeks being taken after giving birth; and arrange flexible work schedules or work site for women that are pregnant, have recently given birth or are nursing.
	E908	Operations do not assign women who are pregnant or have given birth in the last six weeks (or other time period as defined by applicable legislation or medical criteria, whichever is higher) to: – manual handling of loads; – activities subject to shocks, vibrations or movement; – work environment exposed to extremes of heat or cold or to hazardous materials; – application of pesticides, particularly those with reproductive toxicity; or – any other activities that pose risk to them, the fetus or the infant.
	E909	Operations do not reduce payment to women if job or tasks reassignment is necessary due to pregnancy or nursing.
	E910	Operations protect women at the workplace, and encourage respect between workers., by implementing mechanisms such as gender committees and training activities.

Occupational Health & Safety (OHS)

F. Occupational Health & Safety (OHS)

Agriculture, apart from being the second largest source of employment worldwide- employing around 948 million people, almost one-third of the world's labour force (ILOStat, 2017)-,is also one of the most hazardous occupations worldwide (ILO, 2013). In some countries the fatal accident rate in agricultural activities is twice as high as the average for all other industries. According to the International Labour Organization (2011), approximately 50% of the total of annual fatal workplace accidents globally correspond to agricultural workers.

Agricultural work is by nature physically demanding because it usually involves long periods of standing, bending, stooping, carrying and other repetitive movements in awkward body positions (FAO, ILO & IUF, 2007). It also involves a wide range of different management practices and types of machinery, animals, plants, and products, working both in indoor and outdoor environments under widely varying geographic and climatic conditions. The risk of accidents is increased by fatigue, poorly designed tools and equipment, lack of training and poor worker health in general (FAO, ILO & IUF, 2007; ILO, 2011 and 2014).

Yet agricultural workers have very few resources available in terms of access to health care, wages and income, insurance, and other benefits (FAO, ILO & IUF, 2007). Many are contract or piece rate workers and are often excluded from employment injury benefits and insurance schemes and poorly covered by labour legislation. Self-employed farmers are usually not covered by social security benefits and are not enrolled in any kind of insurance scheme because of the high additional costs (ILO, 2011 and 2013). These conditions affect not only workers' health and general wellbeing, but also have a negative impact on productivity. Poor living and working conditions in rural areas are part of a vicious cycle, leading to low productivity and low-income generation, which in turn stifle rural economic development (ILO, 2013).

As achieving safe work conditions is key to improving productivity and the wellbeing of agricultural workers, SAN offers an approach towards managing occupational health and safety (OHS) in agricultural and livestock operations that:

- actively addresses occupational health and safety risks to prevent and minimize accidents and health problems;
- encourages agricultural operations to monitor and update all OHS related actions and results to foster improved work environments;
- focuses agricultural producers and workers' training on how to conduct their tasks in a safe manner;
- encourages the use of practices, mechanisms, tools, and equipment to protect producers and workers' health and minimize the risks to their health and safety;
- promotes the use of personal protective equipment (PPE), especially when hazardous substances are used; and
- promotes safe equipment and infrastructure.

Agriculture is also the most important sector for female employment in many regions, especially in Africa and Asia, and a major proportion of agricultural workers are women (ILO, 2011).Therefore SAN's approach also includes specific guidance and best practices recommendations to protect women's health, with emphasis on women that are pregnant, nursing or have recently given birth.

F.1. Sustainability goal: Occupational health and safety management

Outcomes	ID	Performance Indicators /Best practices
Occupational health and safety risks for workers, bystanders and visitors are addressed to prevent and minimize accidents and associated health problems.	F101	Operations implement an Occupational Health & Safety (OHS) management plan that: – is in accordance with the reality of their operations, and their workforce; – is developed by competent professional or organization – is based on health and safety risks analysis; – identifies and characterizes biological, physical and chemical hazards by job types or physically demanding tasks; – describes and rates risks (frequency of potential occurrence, potential danger or impact); – describes emergency scenarios and protocols to address risks (communication, training, equipment, procedures, first aid); – indicates the communication, training, equipment or procedures, medical exams and first aid needed to prevent or reduce those risks rated as high to worker health or other people; – monitors the planned results; and – complies with applicable legislation.
	F102	Operations designate a qualified OHS officer, who is responsible for ensuring the implementation of the OHS management plan.
All OHS related actions and results are monitored, updated, and improved.	F103	Operations have an OHS Committee (or any other participatory mechanism) that: – is freely chosen by workers; – monitors and regularly revise the OHS plan actions; – recommends improvements and updates into the OHS plan, according to the changes of the operations' facilities, properties, productive systems, and workforce; and – ensures compliance with applicable legislation.
	F104	The OHS committee (or any other participatory mechanism) documents its decisions and associated activities.
	F105	Operations consider the OHS committee's (or any other participatory mechanism) findings, decisions and recommendations when addressing OHS challenges or updating the OHS plan.

Outcomes	ID	Performance Indicators /Best practices
Producers and workers perform their tasks safely, minimizing the risks to environmental and human health, and preventing work-related accidents.	F106	Operations train all workers that handle or come into contact with hazardous substances[12] and workers that carry out risky tasks on safer management techniques and how to perform their duties safely.
	F107	Operations ensure that all training activities are conducted by competent professionals.
	F108	Operations include the following topics during training activities: - explanation of the names, formulations, toxicity, health risks, and other relevant MSDS information related to hazardous substances in use; - techniques for the correct handling of equipment and hazardous substances; - preventative measures for reducing possible damage to health and the environment caused by equipment or hazardous substances; - correct use of personal protective equipment (PPE)[13]; and - emergency procedures and first aid to address accidents, spillover of hazardous substances or other potentially poisoning situations.
	F109	Operations respect the workers' right to remove themselves from situations that pose imminent risk to their life or health, without the immediate authorization of their supervisors and without receiving any reprisals or other negative consequences.
	F110	Workers perform their tasks safely and confirm that they have received training about risks reduction and accidents prevention.

[12] *See the definition of Hazardous substance in Section IV: SAN Technical Concepts*

[13] *See the definition of Personal Protective Equipment (PPE) on Section IV: SAN Technical Concepts*

F.2. Sustainability goal: Protection of workers' health

Outcomes	ID	Performance Indicators /Best practices
All workers and producers that handle hazardous substances or perform other risky tasks use the correct Personal Protective Equipment (PPE) to minimize the risks to their health and integrity.	F201	Operations provide suitable PPE[14] free of cost to workers that handle hazardous substances[15] and that perform other risky tasks; require those workers to use the PPE (without exceptions) and provide them with training on how to use the PPE to mitigate health risks.
	F202	For agrochemical applications: operations set the PPE requirements according to the product MSDS, product label or technical information, or competent professional recommendations, whichever is more stringent. For other risky tasks: operations set the PPE requirements according to the risk analysis of the OHS Plan.
	F203	Operations apply substances listed in the SAN List of Risk Mitigation Pesticides as having inhalation risks, only if: - restricted entry intervals are enforced; and - respirators with an organic vapor (OV) cartridge or canister with any N, R, P, or 100 series pre-filter are used; and - all application sites are flagged and clearly signaled to indicate inhalation risks to bystanders.
The risks of poisoning, intoxication and chronic illnesses to workers and bystanders are minimized.	F204	Operations prevent the access of people to pesticide application areas by implementing Restricted Entry Intervals (REI) as stipulated in the product's MSDS, label o security tag, whichever is more stringent. When two or more products with different REIs are used at the same time, operations apply the longest interval.
	F205	Operations ensure that workers that handle hazardous substances or perform other risky tasks receive free medical exams as specified in the OHS plan and according to applicable legislation (including cholinesterase levels tests in workers that handle organophosphates or carbamates). Exams are conducted prior to the first-time workers apply these substances or conducting such tasks on the farm to establish their baseline, and periodically thereafter if they remain assigned to these tasks. Operations facilitate workers' access to and explain the results their medical exams[16].
	F206	Operations reassign tasks of those workers with temporary health conditions or short-term disabilities that impair their ability to carry out their job. Reassignment covers the length of the disability period, and remuneration is not affected by such reassignment. Operations reassign pesticide handlers with results outside of the accepted cholinesterase levels to other tasks that do not involve use of organophosphates or carbamates.

[14] See the definition of Personal Protective Equipment on Section IV: SAN Technical Concepts
[15] See the definition of Hazardous substance in Section IV: SAN Technical Concepts
[16] According to SAN Recommendations, operations should stop the use of Highly Hazardous Pesticides (D109.)

Outcomes	ID	Performance Indicators /Best practices
The risks of poisoning, intoxication and chronic illnesses to workers and bystanders are minimized.	F207	Operations do not assign women who are pregnant, nursing or have given birth in the last six weeks (or other period as defined by applicable legislation or medical criteria, whichever is higher), to activities that pose risk to the women's, fetal or infant health.
	F208	Operations ensure that first aid equipment is available at the workplace for offices, processing areas, and other central facilities. First aid kits are available in the field and their contents is based on the most common or likely emergencies in the field.
	F209	Operations designate and train workers to take charge of emergency procedures and first aid to address accidents, spillover of hazardous substances, poisoning situations, or any other emergency scenarios. At least one of these workers is available during operating hours and in areas close to the highest number of active workers.
	F210	If workers' health has been permanently affected, or they are permanently injured due to the work on site, operations compensate for damage, injury, and chronic illnesses.

F.3. Sustainability goal: Safe equipment and infrastructure

Outcomes	ID	Performance Indicators /Best practices
Facilities are designed to be safe and are well equipped to minimize risks to the workers' health and safety.	F301	Operations design workshops, storage areas, and processing facilities for the safe storage of materials; and restrict access only to trained and authorized personnel.
	F302	Operations keep storage areas: – equipped and identified in accordance with the type of stored substances and materials; – clean and organized; – with sufficient artificial or natural light to enable work activities and to find the emergency exits; – with sufficient natural ventilation to avoid the accumulation of odors and vapors; – equipped with firefighting tools to safely remediate any spillage of hazardous substances or materials; and – equipped with emergency showers and eye-washing facilities where hazardous substances are stored or mixed.
	F303	Operations provide handlers of hazardous substances and agrochemicals with facilities to bathe and change their clothes after finishing the daily application schedule and before leaving the workplace at the end of the workday.
	F304	Operations have clean and functional toilets and washing facilities available at the workplace in all areas close to the highest number of active workers, including offices, processing areas, and other central facilities.
	F305	Operations provide and maintain natural or built shelter for meals and rest during the work period to protect workers from intense sun, rain, and lightning in the field and other exposed areas.

Wellbeing of workers and their families

G. Wellbeing of workers and their families

Agricultural workers and their families play a fundamental role in the development and operation of the agriculture sector, and in food production systems. Ensuring their wellbeing is essential to the sustainability of production units and their commitment to human development.

Despite their contribution to food security and economic growth worldwide, agricultural workers –especially wage earners– face conditions that negatively affect their livelihoods. Approximately two-thirds of the world's poor work in agriculture, and conditions in rural areas and agricultural landscapes limit workers and their families' access to decent wages, potable water, basic education, health care and safe housing conditions (ILO, 2017).

Essential needs, the elements of a decent standard of living for workers, smallholders, and their families, are defined as having access to or having sufficient income to afford food, water, housing, education, health care, transport, clothing, and provision for unexpected events (Anker & Anker, 2013 and 2017). SAN sustainable agriculture programs establish the provision of essential needs as the foundation for a decent standard of living in rural areas, including:

- **Access to potable water:** a basic human right and critical to effective health protection. SAN recognizes the WHO (2011) definition of safe drinking water as "water that does not represent any significant risk to health over a lifetime of consumption" and embraces its integrated approach to cover all domestic purposes, including water for drinking, food preparation and personal hygiene.
- **Access to basic education**: basic education is defined by SAN as education for workers' and producers' children, which includes reading, writing and basic mathematics (primary education).
- **Access to health care**: based on the ILO's Occupational Health Services Recommendation No. 171 (ILO, 1985), SAN expands its definition as the provision of first aid and emergency treatment in cases of accident or indisposition of workers at the workplace, whether by direct provision of those services or by collaborating with health care providers.
- **Decent housing conditions:** the SAN approach is based on the ILO Guidance on Workers' Housing Recommendation No.115 (1961), where housing provided to workers should meet certain minimum specifications with respect to the nature and standard of the accommodation and facilities to ensure "adequate and decent housing accommodation and a suitable living environment" for workers, including maintenance, improvement, and modernization.
- **Living wage:** the main elements of the eight SAN essential needs are covered by the Global Living Wage Coalition' (GLWC) definition of Living Wage.

On that base, SAN offers a set of practical requirements that guide production units towards the empowerment of workers', smallholders', and their families' wellbeing; including practices for:

- providing safe drinking water and training for treatment options to workers and smallholders, and their families;
- protecting sources of safe drinking water;
- facilitating access to public health care and basic education services;
- providing basic medical services and emergency attention for workers during working hours;
- assuring that in those cases where housing is provided by agricultural operations, it offers good hygienic, safety and health conditions; and
- advancing towards the payment of a living wage according to the benchmarks published by the GLWC.

G.1. Sustainability goal: Essential needs of workers and their families

Outcomes	ID	Performance Indicators /Best practices
When operations provide housing to workers, it is safe, hygienic and protects from adverse weather conditions.	G101	Operations ensure that provided housing infrastructure provider good hygienic, safety and health conditions; including: - access to potable water and sanitation; - waste recollection; - control of disease vectors; - functional and effective smoke evacuation mechanisms; - dry floors and non-leaking roofs, windows and doors; - natural ventilation and light; - protection against rain, wind or cold weather conditions; - sufficient space and separate beds to avoid overcrowding (beds are not arranged in more than two levels, and space does not force unrelated persons to share a bed); - doors with locking mechanisms; - at least one shower per 10 persons, separated by gender; - at least one large laundry sink for every 30 persons; - at least one toilet for every 15 persons, one urinal for every 25 men, one washbasin for every six persons or per family; - areas for recreation and drying clothes; - installed and maintained fire extinguishing mechanisms; and - marked safety exits (for shared spaces) and marked meeting points in case of emergency.
	G102	Operations keep records of all workers and family members allowed to live in management-provided housing.
	G103	Operations respect traditional housing arrangements if they do not represent any hygienic, safety or health risk to the workers and their families.
Producers, workers, and their families have access to safe and clean water.	G104	Operations make potable water available to their workers at the field and infrastructure.
	G105	Operations demonstrate that water consumed by workers is suitable for human consumption and does not pose a serious risk to human health in the immediate and longer term.
	G106	Operations protect potable water sources and water distribution mechanisms to minimize contamination risks caused by human and agricultural activities within their scope.
	G107	Operations maintain water distribution systems and remediate leaks, breaks or other problems that could result in contamination.
	G108	Operations train workers and associated smallholders about potable water treatments and the actions to prevent water contamination.

Outcomes	ID	Performance Indicators /Best practices
Producers, workers, and their families have access to safe and clean water.	G109	Workers and smallholders know how to purify water and are aware of actions implemented to protect potable water sources and distribution mechanisms.
	G110	Workers and their families do not show evidence of illnesses directly related to the quality of the water they consume within the operations, such as recurrent intestinal infections, parasites, diarrhea, or cholera.
Producers, workers, and their families have access to basic education and health care services.	G111	Operations facilitate access to health care and basic education to all workers and their families.
	G112	If applicable legislation requires to contract medical services, operations comply with these requirements. The contracted medical professionals confirm that they have the necessary resources to carry out their activities within the contract scope.
	G113	Where public health or education services are not available, operations improve the access of workers and their families to such services: – when located far from clinics and populations centers, operations transport workers or hire doctors or nurses to offer these services on the farm, and allow workers' families living on the farm or nearby to use such services; – in rural areas and when located far from schools; operations provide teachers and necessary resources to satisfy children's obligatory educational requirements; or the transportation services to the closest public school; and – support to local health care and schools' services, through the provision of resources or infrastructure.

G.2. Sustainability goal: Living wage

Expected outcome	ID	Performance Indicators /Best practices
Workers' remuneration received for a standard work week is sufficient to afford them and their families a decent standard of living.	G201	When a living wage calculation[17] is available for the region and sector, operations implement actions to pay the living wage to all workers. In-kind payments can be an option only if permitted by applicable legislation and cannot exceed 30% of the total wage.

[17] *According to the Anker & Anker Methodology https://www.globallivingwage.org/)*

Wellbeing of rural communities

H. Wellbeing of rural communities

Land and forest resources represent not only a source of food and shelter for rural communities, but are also the basis for their social, cultural, and religious practices, and a core factor in local economic growth (FAO, 2012). As the livelihoods of the rural poor are based on secure and equitable access to and control over these resources, local communities can be condemned to hunger and poverty if they lose their tenure rights to their homes, land, and forests (FAO, 2012 and 2014). Furthermore, the participation of local communities is essential for the success of sustainable management and conservation initiatives (Wali, Alvira, Tallman, Ravikumar & Macedo, 2017).

During the last decades, and in a context of rising global populations, increasing living standards, rising commodity prices, global trade, and the use of food crops as biofuels, unsustainable agricultural practices coupled with weak governance of land and natural resources and lack of secure land tenure have placed heavy pressure on farmlands and forests. Ill-regulated land acquisition and expansion of the agricultural frontier have also become a major problem in many developing countries, posing a major threat to food security, sustainable natural resource management and local livelihoods. Land and resource access pressure have triggered land conflicts and human rights abuses of marginalized social groups, such as indigenous peoples, other customary landowners, women, lower caste people, and ethnic minorities (FAO, 2014).

Based on the concepts of legitimate land use rights, Free Prior and Informed Consent (FPIC), community rights, and respect of socially, culturally, biologically, environmentally, and religiously important areas, SAN proposes a series of best practices that:

- require production units to demonstrate legitimate land use rights;
- respect areas of social, cultural, biological, environmental, and religious importance to the local communities;
- apply FPIC processes to obtain community agreement before initiating activities that may diminish land and resource use rights or collective interest of communities;
- encourage effective communication between the agricultural operations management and local communities;
- identify potentially affected communities and follow up on their complaints; and
- encourage agricultural operations to provide training opportunities to community members, give preference to local providers; and
- offer resources and support to community efforts, to boost local development.

The Sustainable Agriculture Framework is designed to ensure that agriculture and livestock operations fully respect the rights of local communities, secure favorable and sustainable livelihoods and divert pressure away from areas that are fundamental for local livelihoods or have SAN higher conservation values.

H.1. Sustainability goal: Protection of communities' rights

Expected outcome	ID	Performance Indicators /Best practices
Farming and indigenous communities' rights to use their land and resources, are fully respected.	H101	Operations have a legitimate right to use the land and resources within their scope; and demonstrate it by ownership, leasehold, or other legal documents or by demonstration of traditional or community use rights.
	H102	Operations demonstrate that right to use the land is not legally disputed by current or former residents or local communities, including in relation to past dispossession or forced abandonment. In the event of land conflict, operations demonstrate legitimate land use right if a conflict resolution process has been implemented, documented, and accepted by the affected parties.
	H103	Neighbors, workers, and representatives of neighboring communities confirm that the operations' infrastructure and activities respect the community's cultural, religious, and social areas and activities.
	H104	Operations implement and document an FPIC procedure to reach community consent before initiating any activity that diminishes the land and resource use rights or collective communities' interest.
	H105	Communities and local stakeholders verify the results of the operations' FPIC procedures.
	H106	If community rights are diminished or there is a major impact on the collective interests of communities, operations negotiate a compensation commensurate with the loss.
	H107	If important social, environmental, cultural, or religious sites are found within the operations' scope, operations cooperate with competent authorities and take steps to prevent, reduce and control the impacts on these sites.

H.2. Sustainability goal: Support to local communities

Outcomes	ID	Performance Indicators /Best practices
Operations support the development of local communities and reduce potential negative impacts of their activities into the local livelihoods.	H201	Operations identify nearby communities potentially affected by their activities, and to establish effective communication mechanisms with community leaders and local authorities.
	H202	Operations receive, address, and follow up on community complaints that are accessible to and understood by community members according to their literacy levels and language.
	H203	Operations give preference to local service providers, if available and economically feasible.
	H204	Operations supply resources and labor or contribute in some other way to the economic development of the surrounding communities.
	H205	Operations protect and conserve the natural and cultural resources shared with local communities.

Sustainable livestock production

I. Sustainable livestock production

Livestock is a very important sector socially and politically. The livelihoods of half the 768 million people living in poverty worldwide depend directly on it (ILRI, 2008; Robinson et al, 2011; World Bank, 2013). Livestock provides 14% of the total calories and 33% of the protein in people's diet at global level (FAOStat, 2013), making a very important contribution to food security by providing people with essential vitamins and minerals.

Growing populations and incomes, along with changes in food consumption and preference patterns, are rapidly increasing the demand for livestock products, and globalization is boosting the trade of livestock inputs and products. Global production of meat is projected to more than double by 2050 (especially for beef and sheep) (OECD & FAO, 2018); and that increase in production is causing concern because of the negative impact that current livestock management practices have over the natural environment.

Livestock is by far the single largest anthropogenic user of land, with up to 26% of terrestrial areas dedicated to rangelands and about 33% of croplands for fodder production (FAO; 2009; FAO-AGAL, 2016). Expansion of livestock production is a key driver of deforestation, especially in some regions of Latin America. About 20% of the world's pastures and rangelands, with 73%of rangelands in dry areas, are degraded to some extent, mostly from overgrazing, and soil compaction and erosion caused by livestock (FAO, 2006).

The sector also uses large amounts of water, not only for drinking and servicing the animals, but also for irrigating feed crops and forage, and during the processing of animal products and can contribute to water pollution through discharge of wastes, especially surpluses of nitrogen and phosphorus (FAO-AGAL, 2016). Additionally, livestock make a significant contribution to climate change, being responsible for 14.5% of human induced GHG emissions (Gerber et al., 2013).

Understanding that the positive or negative impact of livestock over the environment depends directly on the production intensity, the specific production practices, the species bred, and the local ecological condition; SAN's approach to the sustainability of livestock relies on practices that:

- improve productivity and input use by implementing a multi-level system for feed resources and an associated management plan;
- minimize potential negative impacts on natural resources and ecosystems by halting the destruction of natural ecosystems, optimizing water and land use, and treating of residual waters;
- reduce GHG emissions and improve the systems' capacity as carbon sinks;
- ensure animal welfare, meaning that animals are healthy, comfortable, well-fed, safe, can behave naturally, and are not subject to pain, fear, and stress;
- minimize food safety risks through sanitary protocols and animal health monitoring;

- implement mechanisms for the verification of the animal's origin and breeding process throughout the supply chain; and
- fully respect the rights of livestock operations' workers (better working conditions) and local communities, especially those related to land and natural resource use.

I.1. Sustainability goal: Animal and animal by-products traceability

Outcomes	ID	Performance Indicators /Best practices
Verification of animal origin and breeding process is enabled throughout the supply chain.	I101	Operations implement an individual animal identification system, including: - ear tags - microchips - tattoos - ruminal boluses
	I102	Operations keep animal life records associated to their individual identification with: – dates of birth/purchase and sale/death; – animals' origin: if born within the operations management, information about parental lines; if bough from third parties, origin's farm; and – management practices: disease treatment, sanitary controls, and productivity records.
	I103	Operations maintain each animal record for at least one year after sale or death for traceability purposes
	I104	Operations do not breed transgenic nor cloned animals.

I.2. Sustainability goal: Animal's health and welfare

Outcomes	ID	Performance Indicators /Best practices
Animals are healthy, comfortable, well-fed, safe, can behave naturally and are not subject to pain, fear, and stress.	I201	Operations raise livestock in systems that provide sufficient space, proper facilities and company that allow animals to express normal behavior: – stall housing and nomadic production systems are not practiced; and – feedlots are only used if animals have the opportunity for movement and exposure to sunlight in outdoor ranging areas, and if feedlots are used only during the final fattening stage of the animals.
	I202	Operations implement actions related to genetic selection to balance productivity needs with the animals' health and welfare (both in the short and the long term).
	I203	Operations do not withhold treatment to preserve an animal's eligibility for the market.
	I204	Operations do not use chemical substances (such as potash) and hot iron methods for branding; nor practice penis-deviation.
	I205	Animals do not present any signs of abuse, neglect, or cruelty: poor body condition, noticeable trauma, lack of food and malnutrition symptoms, lack of sanitation; and/or severe pest infestations.
	I206	Operations ensure that all animal handling and treatment activities are conducted by trained personnel, and that personnel do not hit or molest animals to induce movement.
	I207	Operations feed animals according to the nutritional needs of their life stages: – newborn animals are fed with colostrum; and – young ruminant animals are fed with milk or milk substitutes until their development allows for digestion of fodder.
	I208	Operations do not feed their animals with human excrement, animal by-products, or animal feed containing such components.
	I209	Operations provide animals with safe and clean water in sufficient quantities to avoid dehydration. Water quality is constantly monitored and avoids any negative health effects for the animals.
	I210	Operations castrate animals before two months of age and only by surgical methods or emasculation. If castration needs to be done after two months, operations apply pain relief medication during and after castration.
	I211	Operations dehorn animals before two months of age, and do not use hot iron nor excision processes. After two months of age, only tipping is permitted.
Animals are healthy, comfortable, well-	I212	Operations develop and implement a herd health system focused on pest prevention methods and endorsed by a trained technician.

Outcomes	ID	Performance Indicators /Best practices
fed, safe, can behave naturally and are not subject to pain, fear, and stress.	I213	Operations implement preventative actions to minimize the risk of entry and spread of diseases within their facilities.
	I214	Operations implement an animal health monitoring system that is supervised by competent professionals in veterinary science.
	I215	Operations demonstrate that treatment of diseases is according to the recommendation of a veterinarian or legally authorized professional; and apply all medications and vaccines according to the label instructions or recommendation of a veterinarian or legally authorized professional.
	I216	Operations administrate antibiotics only as a remediation measure and never as a prevention measure to avoid developing resistance.
	I217	Operations reserve euthanasia for animals with incurable or terminal diseases; and demonstrate that chosen euthanasia methods are swift and painless.
	I218	Operations implement a protocol compliant with applicable legislation to handle diseased animals that represent contagious and infectious risks.
	I219	Operations milk dairy and double purpose dams regularly, to prevent any negative health impacts and/or conditions.
	I220	Operations train workers and producers within their scope in welfare and animal management practices, to reduce animals' pain, stress, and injury.
	I221	Workers and producers have received training about welfare and animal management practices and demonstrate that the practices they carry out reduce animals' pain, stress, and injury.
	I222	Operations keep infrastructure for livestock management clean and control disease vectors. Provided infrastructure allows animals: - sufficient and clean bedding; - natural light; - ventilation; and - protection from extreme weather conditions and events.
	I223	Operations design, build and maintain chutes, alleys, and other restraining equipment and facilities to reduce animals' stress and injury. There is no evidence of hazards such as pointy ends, broken platforms, nor steep slopes.
	I224	Operations design and designate areas for the isolation and treatment of injured or sick animals.
Animals are healthy, comfortable, well-fed, safe, can	I225	Operations design and build animal loading and unloading structures to ensure animal safety. Animal loading and unloading infrastructure does not demand the animal to jump.

Outcomes	ID	Performance Indicators /Best practices
behave naturally and are not subject to pain, fear, and stress.	I226	During transportation, operations assure compliance with applicable legislation and take actions to avoid animals being contained in a vehicle for more than 24 continuous hours.
	I227	Operations do not transport animals that are sick, severely injured or have open wounds, nor dams that are in the last month of pregnancy, or that have recently given birth; except for emergencies and veterinary treatment purposes.

I.3. Sustainability goal: Improved productivity

Outcomes	ID	Performance Indicators /Best practices
Productivity is improved and input use is optimized.	I301	Operations document reproduction periods and activities to reduce inbreeding and improve herd genetics.
	I302	Operations implement a multistrata system for feed resources production.
	I303	Operations implement a pasture and forage management system that includes: – selection of pasture/forage species considering agroecological conditions, production rates, nutritional value, non-invasiveness, resistance to pests, and climatic variability; – periodic evaluation of pasture/forage condition; – assessment of weed infestation levels and pest control actions; – fertilization methods; and – actions to avoid overgrazing and pasture degradation.
	I304	Operations improve their grazing management through grazing rotation arrangements.
	I305	Operations improve their feed resources, through the establishment of protein banks, the use of locally adapted and highly nutritional pastures, the establishment of agroforestry systems, and/or the elaboration of silage.

I.4. Sustainability goal: Mitigation of environmental impacts

Outcomes	ID	Performance Indicators /Best practices
Potential negative impacts of productive systems on natural resources and ecosystems are minimized and GHG emissions are reduced.	I401	Operations do not destroy any natural ecosystems from the date of initial engagement with SAN programs onwards. Past no-destruction periods can be defined for each operation based on risk conditions.
	I402	Operations provide livestock with water and feed within pasture lots to avoid degradation in areas not designated for animal transit.
	I403	Operations prevent the entry of livestock animals into natural ecosystems and protected areas to prevent their degradation.
	I404	Operations select and manage routes where animals cross aquatic ecosystems to reduce degradation.
	I405	Operations control propagation of invasive plant species caused by the movement of animals through the farms.
	I406	Operations manage the herd size and age structure to prevent over-grazing and soil compaction, based on calculations of animal units per hectare according to pasture characteristics.
	I407	Operations implement additional actions for soil management and reduce erosion and compaction, through re-vegetation of steep areas, designation of specific areas for animal transit, terracing, sediment control basins, and/or minimization of herbicide use.
	I408	Operations collect manure from stables and enclosures; and compost it or treat it through anaerobic treatment, compacting and/or covering to reduce pathogens and methane gas emissions.
	I409	Operations monitor the use of veterinary products for pest control and disease treatment to prevent soil, water, or ecosystem contamination.
	I410	Operations only use medications and vaccines registered in the country and approved by local animal health authorities.
	I411	Operations do not administrate any of the following substances to their animals: – Organochlorinated substances; – Anabolics to promote muscle mass increase; – Hormones to stimulate higher production; – Non-therapeutic antibiotics (preventive medication or promotion of higher production). – Clenbuterol, Diethylstilbestrol (DES), Dimetridazole, Glicopeptids, Ipronidazole; – Chloramphenicol, Fluoroquinoles, Furazolidone; and – Diclofenac and Aceclofenac.
	I412	Operations store safely all medications, according to the label instructions.
	I413	Operations train workers and producers within their scope on best management practices to reduce negative impacts of the productive systems on the environment.

I.5. Sustainability goal: Mitigation of sanitary risks

Outcomes	ID	Performance Indicators /Best practices
Food safety risks are minimized by the implementation of sanitary protocols.	I501	Operations respect the withdrawal periods of veterinary products for animals and sub products (such as dairy) according to the instructions of the applied product's label.
	I502	Operations keep milking infrastructure clean and free of waste, and all equipment free from excrement and in good operating condition.
	I503	Operations implement a sanitation protocol for milking equipment and personnel: – utensils and equipment are sterilized or disinfected; and – hands are washed or disinfected with non-irritating substances before each dam is milked.
	I504	Operations minimize and reduce the risk of zoonotic diseases.
	I505	Operations handle animals' carcasses with sanitary and infectious issues according to the protocols established by applicable legislation.

Climate change mitigation and adaptation

J. Climate change mitigation and adaptation

Agriculture, rural livelihoods, sustainable management of natural resources and food security are inextricably linked within the development and climate change challenges of the twenty-first century (Tubiello, 2012). Rapidly rising concentrations of greenhouse gases, higher land and sea temperatures and increased frequency and magnitude of extreme weather events and wildfires pose enormous risks to agriculture, soil, and freshwater availability, and affect the livelihood and food security of billions of people around the world, especially in developing countries.

Agriculture is not only a fundamental human activity put at risk by climate change. It is also a major driver of environmental and climate change itself, as it has the largest human impact on land and water resources (FAO, 2016). About 1.6 billion hectares of arable land (around 12.5% of total ice-free land) are used for crop cultivation, and an additional 2.5 billion hectares are used for pasture. Roughly four billion hectares are forested land, 5% of which is used for plantation forestry (FAOStat, 2015a). In addition to land resources, agriculture is a major user of water. By 2010, over 300 million hectares of arable land was under irrigation, utilizing 2500 billion m^3 of water annually, representing roughly 70% of freshwater resources withdrawn from aquifers, lakes, and rivers by human activity (FAO, 2011). Finally, significant quantities of chemical inputs are applied to achieve high yields in intensive production systems including about 109 million annual tons of nitrogen, leading to significant regional pollution (FAOStat, 2015b).

As a result of these large-scale activities, agriculture is a significant contributor to land degradation, deforestation, and biodiversity loss, and a major emitter of greenhouse gases. It emits 13-15 billion tons of carbon dioxide per year into the atmosphere, about one-third of the total amount caused by human activities. Overall, agriculture is responsible for 25% of carbon dioxide (largely from deforestation), 50% of methane (rice and enteric fermentation), and more than 75% of nitrous oxide emissions (largely from fertilizer application) annually produced by human activities (Tubiello, 2012).

Nevertheless, agriculture is one of the few sectors that can both contribute to greenhouse gas emissions and to the mitigation and sequestration of carbon emissions. With growing concerns regarding the decline of non-renewable energy sources and the degradation of the natural environment, it is indisputable that sustainable agriculture is seen as an important goal throughout the world (FAO, 2016b).

SAN's sustainable agriculture approach is distributed along all sections of the SAN-SAF and focuses on building resilient agroecosystems and reducing the carbon footprint of agricultural and livestock activities, by:

- promoting agriculture and conservation practices that restore and increase natural and artificial carbon sinks;
- offering solutions to minimize and compensate greenhouse gas emissions, by implementing responsible fertilizer and pesticide management, reducing the use of fossil fuels and their by-products, and incorporating renewable energies into production systems;
- promoting the diversification of agroecosystems to improve their adaptability to changing climate patterns;
- encouraging soil management practices that contribute to productivity while lowering the pressure of agricultural activities over soil resources;
- improving water efficiency through better management practices that reduce vulnerability to variable conditions of water availability;
- promoting the use of weather monitoring systems and trends analysis to reduce the risks associated to climate variability; and
- assessing livestock management practices to enable adaptation and a reduction of the systems' vulnerability to climate variability.

J.1. Sustainability goal: Climate change mitigation

Outcomes	ID	Performance Indicators /Best practices
Natural and artificial carbon sinks are restored and increased.	J101	Operations implement practices to increase and conserve soil carbon (organic matter): – permanent ground covers or cover crops; – crop rotation; – reduced tillage or no-tillage methods; – use of organic fertilizers and low toxicity substances; – crop and pasture residue mulching; and/or – management of nitrogen inputs to favor biomass humification.
	J102	Operations implement practices for increased biomass production: – intercropping, – crop rotation; – agroforestry systems; and/or – live fences.
	J103	Operations conserve and restore natural carbon sinks: – forests; – coastal marine lands; – peatlands; and – grasslands.

Outcomes	ID	Performance Indicators /Best practices
Greenhouse gas emissions are minimized and compensated.	J104	Operations do not use production methods that require permanent flooding.
	J105	Operations compost organic waste or use any other method to reintegrate it into their productive systems.
Fertilization practices minimize nutrient losses and GHG emissions	J106	Operations implement nutrition management practices that are based on the assessment of crop/pasture needs, soil fertility and environmental conditions. Crop/pasture needs assessments can be done by using indicator plots, plant tissue analysis, application of fertilizer according Maximum return to Rate (MRNT) or Agronomically Optimum Rate (AONR) calculations, or any other effective mechanisms.
	J107	Operations implement practices to enhance Nitrogen fertilizer efficiency and reduce losses by leaching: - splitting Nitrogen applications; - use of slow, controlled release and stabilized fertilizers; - use of urease and nitrification inhibitors; - use of non-nitrate-based fertilizers during early applications (right before or after sowing); and/or - incorporation of nitrogen-fertilizers into the soil (especially in steep slopes).
Fertilization practices are improved to minimize nutrient losses and GHG emissions.	J108	Operations use different nutrient sources, to avoid excessive reliance on petroleum-based fertilizers.
	J109	Operations implement practices to enhance soil nitrogen fixation, such as: planting of nitrogen-fixing ground covers or cover crops; and application of compost, mulch, and green manures.
Use of fossil fuels and by-products is reduced.	J110	Operations invest in energy-efficient farm equipment and vehicles to reduce oil consumption.
	J111	Operations manage their providers and give preference to local inputs to optimize conveyance and reduce oil consumption.
	J112	Operations minimize the purchase or use of inputs that generate waste and emissions.
	J113	Operations evaluate if service providers minimize waste generation & fossil fuel use.
Renewable energies are incorporated into the productive systems.	J114	Operations develop and implement an energy efficiency plan including: – data of quantity and type of energy sources and uses; – practices for increasing energy efficiency; and – targets for reducing dependency on non-renewable energy sources.
	J115	Operations demonstrate, based on record keeping, reductions in overall energy use or non-renewable energy use per unit of grown or processed product.
	J116	Operations invest in renewable energy generation technologies: biogas and biomass energy from crop residues and manure; solar, wind and/or hydroelectric energy.

J.2. Sustainability goal: Adaptation to climate change

Outcomes	ID	Performance Indicators /Best practices
Productive systems are diversified and adapted to local conditions, reducing their vulnerability to climate variability.	J201	Operations only grow crops and graze livestock where soils and climate conditions are proven to be suitable for that crop/breed.
	J202	Operations give preference to locally adapted species and phenotypes.
	J203	Operations invest in the selection of crop and livestock species and phenotypes that have higher yield potentials under the operations' environmental conditions.
	J204	Operations grow drought, heat, and salinity tolerant crops through the implementation of artificial selection techniques.
	J205	Operations diversify and integrate different productive systems.
Soil management practices contribute to higher yields and agroecosystems' resilience.	J206	Operations increase and manage soil carbon (organic matter) using organic fertilizers and low toxicity substances.
Water use efficiency and agroecosystems resilience are improved.	J207	Operations manage river basins to prevent water logging, erosion, and nutrient leaching.
	J208	Operations adjust irrigation timing and mechanisms according to climate data and trends.
	J209	Operations implement or consult weather monitoring systems to collect climate data; and adapt their productive systems accordingly.
Use of weather monitoring systems and trends analysis reduce the risks associated to climate variability.	J210	Operations schedule farm management practices (such as irrigation and nutrient application) to better match altered phenological cycles and precipitation regimes.
	J211	Operations are aware and have access to early warning systems that allow them to prepare and face climate variability and extreme weather events.
	J212	Livestock operations implement intensive production systems and grasslands.

IV. SAN Technical Concepts

Competent professional

An individual with demonstrated professional expertise, skills, experience, and credentials in a specific subject area.

Forced labor

SAN adopts the forces labour definition given by the International Labour Organization (ILO), which is based on the Forced Labor Convention, 1930 (No.29), the Abolition of Forced Labour Convention, 1957 (No. 105) and the Protocol of 2014 to the Forced Labour Convention, 1930 (P029). SAN defines forced labour as:

> *"…situations in which persons are coerced to work through use of violence or intimidation, or by more subtle means such as accumulated debt, retention of identity papers or threats of denunciation to immigration authorities. Forced labour, contemporary forms of slavery, debt bondage and human trafficking are closely related terms though not identical in a legal sense. Most situations of slavery or human trafficking are however covered by ILO's definition of forced labour" (ILO, 2014b).*

Article 2(1) of Convention No. 29 defines "forced or compulsory labour" as "all work or service which is exacted from any person under the menace of any penalty and for which the said person has not offered himself voluntarily". This definition consists of three elements:

a. Work or service. "All work or service" refers to all types of work, service, and employment, occurring in any activity, industry, or sector, including in the informal economy. Forced labour can occur in both the public and private sectors.
b. Menace of any penalty. The "menace of any penalty" refers to a wide range of penalties used to compel someone to perform work or service, including penal sanctions and various forms of direct or indirect coercion, such as physical violence; psychological threats; control of access to food, water, toilets, canteens, medical care, or health clinics; or the non-payment of wages. The "penalty" may also consist of a loss of rights or privileges (such as a promotion, transfer, or access to new employment).
c. Involuntariness. The terms "offered voluntarily" refer to the free and informed consent of a worker to enter an employment relationship and his or her freedom to leave the employment at any time. For example, an employer or recruiter could interfere with this freedom by making false promises to induce workers to take jobs that they would not otherwise have accepted, restricting the workers' freedom of movement to and from their employer-provided housing, or forcing workers to work or stay at the workplace.

The ILO Committee of Experts has explained that when adopting the Convention, ILO constituents opted for a broad definition of the term "forced labour"—comprising the three elements described above—rather than enumerating a list of prohibited practices. The use of a broad definition has enabled the ILO supervisory bodies to address traditional practices of forced labour, such as vestiges of slavery or slave-like practices, and various forms of debt bondage, as well as new forms of forced labour that have emerged in recent decades, such as human trafficking (ILO, 2016b, p.5).

Hazardous substances

Based on the definition provided by the OSHA, the U.S. Occupational Safety and Health Administration (29 Code of Federal Regulations (CFR) 1910.1200.) and the U.S. Environmental Protection Agency (40 CFR 355), SAN defines hazardous substances as:

Any item or chemical which can cause harm to people, plants, or animals when released by spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or disposing into the environment, because it has one or more of the following intrinsic 'hazardous properties': explosiveness, flammability, ability to oxidize (accelerate a fire), human toxicity (acute or chronic), corrosiveness (to human tissue or metal), eco-toxicity (with or without bioaccumulation), or the capacity, on contact with air, soil or water, to develop one or more of the above properties.

Hazardous waste streams

SAN adopts the definition of hazardous waste streams given by the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (According to Annexes I and II), that includes:

WASTE STREAMS	
Y1	Clinical wastes from medical care in hospitals, medical centers, and clinics.
Y2	"Wastes from the production and preparation of pharmaceutical products"
Y3	Waste pharmaceuticals, drugs, and medicines
Y4	Wastes from the production, formulation and use of biocides and phytopharmaceuticals
Y5	Wastes from the manufacture, formulation and use of wood preserving chemicals
Y6	Wastes from the production, formulation and use of organic solvents
Y7	Wastes from heat treatment and tempering operations containing cyanides
Y8	Waste mineral oils unfit for their originally intended use
Y9	Waste oils/water, hydrocarbons/water mixtures, emulsions
Y10	Waste substances and articles containing or contaminated with polychlorinated biphenyls (PCBs) and/or polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)
Y11	Waste tarry residues arising from refining, distillation, and any pyrolytic treatment
Y12	Wastes from production, formulation and use of inks, dyes, pigments, paints, lacquers, varnish
Y13	Wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives
Y14	Waste chemical substances arising from research and development or teaching activities which are not identified and/or are new and whose effects on man and/or the environment are not known
Y15	Wastes of an explosive nature not subject to other legislation

WASTE STREAMS	
Y16	Wastes from production, formulation and use of photographic chemicals and processing materials
Y17	Wastes resulting from surface treatment of metals and plastics
Y18	Residues arising from industrial waste disposal operations

WASTES HAVING AS CONSTITUENTS:	
Y19	Metal carbonyls
Y20	Beryllium; beryllium compounds
Y21	Hexavalent chromium compounds
Y22	Copper compounds
Y23	Zinc compounds
Y24	Arsenic; arsenic compounds
Y25	Selenium; selenium compounds
Y26	Cadmium; cadmium compounds
Y27	Antimony; antimony compounds
Y28	Tellurium; tellurium compounds
Y29	Mercury; mercury compounds
Y30	Thallium; thallium compounds
Y31	Lead; lead compounds
Y32	Inorganic fluorine compounds excluding calcium fluoride
Y33	Inorganic cyanides
Y34	Acidic solutions or acids in solid form
Y35	Basic solutions or bases in solid form
Y36	Asbestos (dust and fibers)
Y37	Organic phosphorus compounds
Y38	Organic cyanides
Y39	Phenols; phenol compounds including chlorophenols
Y40	Ethers
Y41	Halogenated organic solvents
Y42	Organic solvents excluding halogenated solvents
Y43	Any congenor of polychlorinated dibenzo-furan
Y44	Any congenor of polychlorinated dibenzo-p-dioxin

WASTES HAVING AS CONSTITUENTS:	
Y45	Organohalogen compounds other than substances referred to in this Annex (e.g., Y39, Y41, Y42, Y43, Y44)

CATEGORIES OF WASTES REQUIRING SPECIAL CONSIDERATION:	
Y46	Wastes collected from households
Y47	Residues arising from the incineration of household wastes

Personal Protective Equipment (PPE)

SAN adopts the OSHA definition of Personnel Protective Equipment:

> *Personnel Protective Equipment (PPE) refers to equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards.(OSHA, n.d.).*

PPE requirements must be defined according to the applied product label instructions. If labels do not provide details of PPE for applicators:

- For substances classified as No-risk or low risk, basic PPE should be provided: long sleeved shirt, long pants, socks, stout/closed shoes, with chemically resistant gloves.
- For all substances indicated as requiring higher level personal protection, the following shall be provided: coveralls over long-sleeved shirt, long pants, socks, and closed shoes, with chemically resistant gloves, with protection for eyes (i.e., a face mask or goggles), and respiratory protection (i.e., a respirator).
- For pesticides labeled as having a requirement to mitigate bystander risks: in addition to the Higher-Level Personal Protection, pesticide handlers shall also be provided with respirators with an organic vapor (OV) cartridge or canister with any N, R, P, or 100-series filter.

Health care

Based on the ILO Occupational Health Services Recommendation, 1985 (No-171 -Clause D. First Aid), SAN defines access to health care as:

> Provision of first aid and emergency treatment in cases of accident or indisposition of workers at the workplace, whether by direct provision of those services or by collaborating with other organizations for it. Health care services also include, where possible and feasible:
>
> a) carrying out immunizations in respect of biological hazards in the working environment;
> b) taking part in campaigns for the protection of health;
> c) providing first aid and emergency treatment in cases of accident or indisposition of their workers' families; and
> d) collaborating with health authorities and other entities within the framework of public health programs.

SAN Natural Ecosystems

According to the Convention on Biological Diversity (1992), an ecosystem is "a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit." (p. 3).

Additionally, SAN (2017) defines natural ecosystems as:

> "*Ecosystems that resemble – in terms of species composition, structure, and function – those that are or would be found in a given area in the absence of significant human management impacts*".

For conservation and management objectives, SAN distinguishes between natural terrestrial and aquatic ecosystems.

1. Terrestrial ecosystems

SAN differentiates four different categories of terrestrial ecosystems: tundra, forests, grasslands, and deserts.

a. Tundra

Tundra vegetation is composed of dwarf shrubs, sedges, and grasses, mosses, and lichens, and occasionally some scattered trees. Tree growth is hindered by low temperatures and short growing seasons due to permanently or almost permanently frozen soil. There are three types of tundra: arctic tundra, alpine tundra, and Antarctic tundra.

The ecotone (or ecological boundary region) between tundra and forest is known as tree line or timberline; and is also covered by the following definition of forests.

b. Forests

Forests are lands dominated by trees with a canopy cover of at least 10% by woody plants taller than 5 meters (FAO, 2015b). To facilitate processes of remote-sensing and detecting possible forest destructions, SAN recognizes three main forest categories:

1) Closed forest (canopy density greater than 50%);
2) Open forest (canopy density between 25% and 50%); and
3) Woodlands (sparse, savanna type forest; canopy density between 10 and 25%) (Hansen, DeFries, Townshend, Carrol, Dimiceli & Sohlberg, 2003).

For the purposes of the SAN definition of natural ecosystems, disturbed places or non-forest natural vegetation located inside forests are still considered a natural terrestrial ecosystem, and therefore are subject to conservation measures as defined within the Sustainable Agriculture Framework.

Forests can be further distinguished according to their biome:

i. *Taiga*

Characterized by coniferous forests consisting mostly of pines, spruces, and larches, also called boreal forest or snow forest. Taiga is found throughout the high northern latitudes, between the tundra, and the temperate forest, from about 50°N to 70°N.

ii. *Temperate forest*

1. Broadleaf (deciduous) and mixed forest is dominated by trees that lose their leaves each year. They are found in areas with warm moist summers and mild winters.
2. Coniferous forest is comprised of evergreen forests in areas with warm summers and cool winters. Common in coastal areas of regions with mild winters and heavy rainfall, or inland in drier climates or montane areas. Tree species include pine, cedar, fir, and redwood.

iii. *Mediterranean forest, woodland, and scrub*

Occur in regions with hot and dry summers with cool and moist winters when most precipitation arrives. Its animal and plant species can adapt to the stressful conditions of long, hot summers with little rain.

iv. *Tropical and subtropical forest*

Occur roughly within the 28-degree latitudes (in the equatorial zone between the Tropic of Cancer and Tropic of Capricorn).

1. Moist broadleaf forests are characterized by low variability in annual temperature and high levels of rainfall (>2000 millimeters annually). Forest composition is dominated by semi-evergreen and evergreen deciduous tree species.
2. Dry broadleaf forests occur in climates that are warm year-round and may receive several hundred millimeters of rain per year but have long dry seasons which last several months. Deciduous trees predominate these forests, and during the drought a leafless period occurs, which varies with species type.
3. Coniferous forests are found predominantly in North and Central America, these tropical regions experience low levels of precipitation and moderate variability in temperature. These biomes feature a thick, closed canopy which blocks light to the floor and allows little underbrush. As a result, the ground is often covered with fungi and ferns. Shrubs and small trees compose a diverse understory.

v. *Mangrove*

Ecosystem with shrub and tree species that occurs in waterlogged, salty soils of sheltered tropical and subtropical shores, rivers, and estuaries, subject to the twice-daily ebb and flow of tides, fortnightly spring and neap tides, and seasonal weather fluctuations. They stretch from the intertidal zone up to the high-tide mark.

c. Grasslands, savannas and shrublands

Grasslands are terrestrial biomes whose predominant vegetation consists of grass or shrubs.

i. *Tropical and subtropical* grasslands are characterized by annual rainfall levels between 90-150 centimeters with variability in soil moisture throughout the year. Grasses dominate the species composition of these ecoregions, although scattered trees may be common.

ii. *Temperate grasslands:* also known as prairies, pampas, veld, or steppe, are systems that differ from tropical grasslands in the annual temperature regime as well as the types of species found here. These regions are devoid of trees, except for riparian or gallery forests associated with streams and rivers.

iii. *Montane grasslands*: are high elevation (montane and alpine) grasslands and shrublands, including the puna and páramo in South America, subalpine heath in New Guinea and East Africa, steppes of the Tibetan plateaus, as well as other similar subalpine habitats. Their plants and animals are adapted to cool, wet conditions and intense sunlight.

d. Deserts (and Xeric Shrublands)

These are ecosystems where evaporation exceeds rainfall, annual precipitation is less than two thirds of potential evaporation and temperature variability is extremely diverse; and can be classified as hot or cold, semiarid, or coastal.

To survive the harsh environment, plants and animals living in the desert need special adaptations. Plants tend to be tough and wiry with small or no leaves, water-resistant cuticles and often spines to deter herbivores. Some annual plants germinate, bloom, and die over a few weeks after rainfall while other long-lived plants survive for years and have deep root systems able to tap underground moisture. Animals need to keep cool and find enough food and water to survive. Many animals are nocturnal and stay in the shade or underground during the heat of the day, are efficient at conserving water, and remain in a state of dormancy for long periods.

2. Aquatic ecosystems

Aquatic ecosystems are permanent water bodies of fresh, brackish, or salty waters inland from the coastal zone, and areas whose ecology and use are dominated by the permanent, seasonal, or intermittent occurrence of flooded conditions, including inland water and coastal categories.

SAN distinguishes five types of aquatic ecosystems: lake ecosystems (lentic or still water), river ecosystems (lotic), wetlands, coastal areas, and polar ecosystems. The SAN aquatic ecosystem definition covers the littoral zone, which is part of a sea, lake or river that is close to the shore, and comprises artificial wetlands created for the specific purpose of providing habitat for terrestrial wildlife or aquatic life.

a. Lake ecosystems (lentic aquatic ecosystems)

Stationary or relatively still freshwater ecosystems, including ponds and lakes and xeric basin ecosystems.

i. *Lakes*. Areas filled with water, localized in a basin that is surrounded by land, apart from any river or other outlet that serves to feed or drain the lakes. Lakes lie on land and are not part of the ocean, and therefore are distinct from lagoons, and are also larger and deeper than ponds.

ii. *Ponds*. Small bodies of freshwater with shallow and still water, marsh, and aquatic plants.

iii. *Xeric basin ecosystems*. Aquatic ecosystem with little permanent surface water and a relative abundance of springs and pools in desert regions.

b. River ecosystems (lotic aquatic ecosystems)

Flowing water bodies with the velocity of the current being determined by the flow bed's gradient. Faster moving turbulent water contains greater concentrations of dissolved oxygen and supports greater biodiversity than the slow-moving water of lake ecosystems. River ecosystems include deltas or floodplains. Springs also form part of these systems, as well as seasonal systems that do not flow continuously throughout the whole year or during all years.

Streams and rivers that have been altered by sedimentation, polluted runoff, bank erosion, thermal pollution, or impoundments are still considered a SAN natural aquatic ecosystem.

c. Wetlands

Wetlands are dominated by vascular plants that have adapted to saturated soil (Keedy, 2010). SAN considers four main types of wetlands: swamps, marshes, wet grasslands, and bogs (peatlands):

i. *Swamps.* A forested wetland occurring along large rivers where they are dependent upon natural water level fluctuations or on the shores of large lakes.

ii. *Marshes.* A wetland dominated by herbaceous species such as grasses, rushes, or reeds rather than woody plant species. If woody plants are present, they tend to be low-growing shrubs. Marshes can often be found at the edges of lakes and streams, where they form a transition between the aquatic and terrestrial ecosystems.

iii. *Wet grasslands.* Grasslands flooded seasonally or year-round, such as flooded savannas and occurring mostly in the tropics and subtropics.

iv. *Bogs (peatlands):* A bog is a wetland that accumulates peat, a deposit of dead plant material—often mosses. The gradual accumulation of decayed plant material in a bog functions as a carbon sink.

d. Coastal areas

Areas between 50 meters below mean sea level and 50 meters beyond the high tide mark, including coral reefs, intertidal zones, estuaries, coastal aquaculture, and seagrass communities.

e. Polar ecosystems

Areas characterized by low temperatures, low salinity, high plankton levels and permanent extensive ice, both in terms of cover by sheets and in the form of drift ice and icebergs carried by polar currents.

3. Systems not considered SAN Natural Ecosystems

For the SAN Sustainable Agriculture Framework programs and initiatives, the following ecosystems are not considered "natural ecosystems", and thus are not subject to the management measures and restrictions that cover such ecosystems.

a. Terrestrial systems

i. Forestry or fruit tree plantations.

ii. Tree-covered areas that are managed as diversified food production systems, including traditional and modern management systems such as home gardens, orchards, agroforestry systems, and mixed tree-cattle systems (silvopastoril systems).

iii. Areas that are managed as long-rotation swidden (shifting cultivation) systems under traditional, indigenous people, community, or smallholder land-use systems.

iv. Former production areas dedicated to soil fertility recovery (fallow lands) and that will return to production activities.

b. Aquatic systems

i. Artificial pools or lagoons for water treatment, water storage for irrigation, or aquaculture.

ii. Areas that have been made seasonally or perennially wet due to human activity, such as drainage ditches, irrigation ponds, reservoirs, effluent holding ponds, aquaculture ponds, rice paddies, or gravel pits.

4. SAN Higher Value Ecosystems

Although all-natural ecosystems are important for a healthy and balanced environment, there are certain ecosystems that SAN recognizes as having higher value (Table 1), because they are:

1. habitat for endangered or vulnerable species;
2. large and intact ecosystems;
3. rare, threatened, or endangered ecosystems; or
4. suppliers of extraordinary ecosystem services.

Table 1: SAN Higher Value Ecosystems

SAN Higher Value Ecosystem category	Features distinguishing SAN Higher Value Ecosystems from SAN Natural Ecosystems
1. Habitat for endangered or vulnerable species	Natural ecosystems used for reproduction and feeding by individuals of the following vertebrate or plant species: • Species protected by local legislation • Endangered species as determined by IUCN: categories Critically Endangered, Endangered or Vulnerable (IUCN, 2001).
2. Large and intact natural ecosystems	Natural ecosystems with a minimum size of (or minimum size of all its fragments in a specific area): • 100 km^2 or 10,000 hectares according to IUCN (2001)[18] specifications for the extent of occurrence for critically endangered species; or • 500 km^2 or 50,000 hectares and a minimal width of 10 km[19]
3. Rare, threatened, or endangered natural ecosystems	Natural Ecosystems that are: • Protected as determined by local legislation; or • Assessed based on the IUCN (2016) Red List of Ecosystems Categories and Criteria (Bland, Keith, Miller, Murray & Rodríguez, 2017; IUCN 2016).
4. Suppliers of extraordinary ecosystem services	Natural Ecosystems that provide: • Erosion control: vegetated riparian areas next to slopes steeper than 10%; • Flood control: river deltas or floodplains; • Shoreline stabilization and storm protection: Mangroves, coral reefs, and salt marshes; • Ground water replenishment: marsh, swamp, and subterranean karst and cave hydrological systems; • Water purification: floodplain, mudflat, salt marsh, mangroves.

For practical purposes of SAN Sustainable Agriculture programs and initiatives, only vertebrates and plant species are included as part of the assessment of Higher Value Ecosystems Category No. 1 (see Table 1) for their ease of recognition or observation.

[18] A taxon is Critically Endangered when the best available evidence indicates that it meets any of the following criteria (A to E), and it is therefore considered to be facing an extremely high risk of extinction in the wild: B. Geographic range in the form of either extent of occurrence OR area of Occupancy OR both: Extent of occurrence estimated to be less than 100 km^2.

[19] Technically, an Intact Forest Landscape (IFL) is defined as a territory within today's global extent of forest cover which contains forest and non-forest ecosystems minimally influenced by human economic activity, with an area of at least 500 km^2 (50,000 ha) and a minimal width of 10 km http://www.intactforests.org/concept.html.

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