Experiences with ecosystem services walks in Ethiopia
PAN UK, 2017

This Output Note has been developed by PAN UK as one of the outputs for the Darwin Initiative project *Pesticide Impacts on Biodiversity in Ethiopia & Agroecological Solutions* (2013-2016). It aims to:

- Share good practices and useful exercises developed and tested as part of PAN UK's project with others in the Darwin 'community of practice'
- Provide guidance for staff in partner organisations PAN Ethiopia and Institute for Sustainable Development (ISD) to expand these activities, in particular with secondary students in ISD's School Environment Clubs
- Inform and inspire a wider audience to undertake similar awareness-raising activities in their work relating to biodiversity conservation and sustainable management of natural resources

A. Background

Introduction to the Ethiopia Darwin project

Diversity and abundance of Ethiopia's Rift Valley migratory birds are declining, particularly wetland species. National experts have suspected excessive pesticide use in nearby flower, cotton and vegetable farming, aerial spraying of granivorous pest Quelea birds and effluent from caustic soda and pesticide formulation factories along lake shores as an important factor affecting wetland ecosystems. However, data on pesticide volumes entering these ecosystems was scarce and national capacity lacking to conduct the robust ecotoxicological monitoring required to establish any links between pesticide use and impacts on biodiversity.

The PAN UK Darwin project *Pesticide Impacts on Biodiversity in Ethiopia & Agroecological Solutions* addressed this problem by building capacity for ecotoxicology monitoring, along with broader training and awareness-raising on taking an ecosystem approach. National food and farming policies have increased reliance on agrochemicals, but without adequate measures to avoid monitor potential side-effects on and so act to avoid any negative impacts on human and environmental health. Farmers and policymakers are unaware of the economic costs from pesticide harm (e.g. disruption to pollinators and biological pest control) and few Ethiopian stakeholders understand how agro-ecological farming methods which conserve biodiversity can reduce poverty by improving farm income and supporting ecosystem services. Under matched funding from TRAID for improving cotton production and smallholder livelihoods, PAN Ethiopia has conducted Farmer Field School training for Integrated Pest Management with almost 2,000 smallholders since 2013.

B. Learning about and running ecosystem services walks

This first encounter for the Ethiopian partners on the idea of learning about ecosystem services (ES) through a participatory walk took place in Aug. 2013 in the fields and public footpaths around Bore Place organic farm (Commonwork educational centre – see below) in the Kentish Weald, where the project training was held. The aim was to make participants familiar with key ecosystem services: where they are produced and what contributes to their provision; and to identify some different ecosystem services in this mixed arable/dairy farm, with vegetable garden and tree nursery, and its semi-natural habitat surroundings. A Guidance Note on 'How to run an Ecosystem Services Walk' is another output from this project.

A guided walk was led by Colin Tingle, ecotoxicology expert consultant to the project, following the first half of the Commonwork Field Trail. Participants were provided with an Information Sheet on Ecosystem Services prior to the walk (see ANNEX) and given the opportunity to read it, following a short introductory

talk on what the walk would entail. They were also given a record sheet with a series of 'stopping points' as row headings and the 4 categories of ecosystem services as column headings (see Annex).

Twelve stopping points were set on the route that was approx. 2km in length. At each stopping point, Trainees were given 3 minutes to observe the habitat around them and were asked to record their perceptions of which ecosystem services were provided by their surroundings. A nominated trainee was asked to explain to the group which services he/she has recorded and why, provide their records; other participants were requested to add any of theirs that had not so far been mentioned. A discussion then ensued led by the lead Trainer to explore the ecosystem services that had been mentioned and how accurate the perceptions by trainees were. Some time was also spent exploring verbally the relationship between management of the different habitats visited and how that affected the nature, extent and quality of the ES provided. At each stopping point, a different trainee began the assessment of ES.

Habitats visited included:

- Organic market garden
- Pasture for cows
- woodland
- arable field
- woodland edge; pond
- coppice woodland
- woodland stream

Gaining confidence and skill takes a little practice:
The Ethiopian core team then put their learning straight into practice on their own in the two project Rift Valley sites, by running walks for their organisational colleagues and collaborators from the regional Board Ministry of Agriculture in Sep. 2013. Key learning point: from their formal report back and later discussions, they clearly struggled a bit, as this was their first time doing it themselves in a totally different context of ecological/natural capital, land management, and natural resources. They found it easy to spot the obvious and economically important provisioning services (food crops, wood for fuel, fish, reeds for thatch, grazing for livestock, bees for honey) but the regulating and supporting ones are not so visible – these are the microbes, tiny invertebrates and the "mini-worlds" beneath our feet and under the water surface in 'empty' wetlands which deliver many ecological services. We suspect this is a universal challenge, hence the need for and value of doing these walks. People probably need some additional 'hand holding', i.e. supervised practice, with this exercise until they become confident in thinking about and looking for:

- where these 'hidden' services might be operating
- which habitats and particular habitat/ecological features are key 'service providers'
- the land/water use practices that might be helping/hindering these services

C. Putting it into practice

Walks facilitated by project ecotox and Ecosystem Approach consultants

An ecosystem service recording sheet was distributed to all the participants (4 core Ethiopian team + 12 others from local agricultural experts and Batu High School Environment Club teachers and students) so that they could record the different services observed as the walk proceeded. The habitat types in the Lake Ziway monitoring area include; grazing land, polytunnels of the flower farm, discharge channel from the flower farm, reed bed, lake shore, marsh grazing land, terrestrial habitat, and disturbed wetland, swampy and aquatic habitats. During the walk, there were 6 'stopping points' to discuss what the participants observed and recorded. Table 1 summarises the supporting, regulating, provisioning and cultural ecosystem services identified by the participants.

Participants in Lake Ziway walks, Central Rift Valley, Feb. 2014

A second set of ES walks was conducted in Arba Minch, near the area in which PAN Ethiopia is training farmers in sustainable cotton practices. Habitats include lake-side, semi-natural forest, smallholder fields and large scale farms growing cotton and cereals.

Table 1: Ecosystem services identified and recorded around Lake Ziway by participants of walk 1

Service type	Description
Supporting	**primary productivity**: different plants producing biomass include: *Scirpus, Cyperus*, *Typha angustifolia*, *Paspalidium geminatum* & *Nymphaecoerulea*. Plus algae & other smaller plants
	soil formation
	pollination: some plants important for pollinator insects were also around.
	nutrient cycling
	sediment accumulation: via the lake
	water cycle
Regulating	big trees contribute to **micro-climate regulation -** Help both micro and macro-climate regulation
	Climate regulation
	Atmospheric balance
	flood regulation & excess **water storage** during rainy seasons as surrounding rivers & streams flow into lake
	grass & plants play (minor) role to **reduce soil erosion**
	water purification: reed beds help filter & support biodegradation of town effluent & other contaminants
	population regulation: plant spp., birds, insects, smaller inverts & grazing animals from food chains which can play a vital role
	disease regulation: area has healthy food chains, e.g. of insectivorous fish that help keep larvae of mosquitoes & biting midges (vectors of malaria & other diseases) in check

Table 1 (cont.): Ecosystem services identified and recorded around Lake Ziway by participants of walk 1

Service type	Description
Provisioning	Fish - traditional **fishing** in Lake Ziway
	meat & milk from grazing land
	Water - lake water for **irrigation**
	Typha reeds, small trees & other plant materials used for **house roofing, boat making & fibre source**
	some plants/trees used for **wild food**
	fuel wood
	? maybe some **medicinal** plants
Cultural	**aesthetics**: Ziway townsfolk may walk to lake shore to enjoy fresh air, breezes from lake & view of islands makes it an attractive place
	Employment - traditional fishing & boat building is vital for some local livelihoods, plus reeds for crafts, but also **cultural heritage** for Ziway people
	spiritual element - people found the landscape inspiring enough to build Ziway's famous lakeside church here
	educational: School children can come to learn about habitats, interaction between living things & with non-living things
	personal health – used for washing and washing clothes
	recreational: presence of numerous different bird species makes it suitable for bird watching. Lake Ziway is part of Rift Valley/ Red Sea flyway for migratory birds, with resident and migratory bird species. This is also important for tourism. Also used by local people for playing, swimming, etc.

Participants in Arba Minch walks, Southern Rift Valley, Feb. 2014

Table 2. Comments on ecosystem services provision in contrasting sites from Ecosystem Service walks in Arba Minch

Ecosystem Service type	Key comments from walkers
Supporting	Minimal in farmland areas. Primary production minimal as farmland vegetation is cleared except at farm edges & irrigation channels. Soil formation, pollination, nutrient cycling & sediment accumulation also low. Unlike the agro-ecosystem, semi-natural forest area has high primary productivity, pollination, soil formation & nutrient recycling
Provisioning	Food (tomato, maize, cassava, etc.), grazing animals, fibre, cotton & maize stalks as fuel wood are highly obtained from agro-ecosystems. Fuel wood, wild foods also high in natural forest, could also be plenty of medicinal plants.
Table 2 (cont.). Comments on ecosystem services provision in contrasting sites from Ecosystem Service walks in Arba Minch	

Ecosystem Service type	Key comments from walkers
Regulating	Agro-ecosystem areas show low erosion & flood regulation because of low ground cover. Climate regulation is also low except some big trees in smallholders' area contributing to micro-climate regulation. Natural forest has high erosion, flood & climate regulation because rich in large trees, shrubs & herbs.
Cultural	Low in agro-ecosystems except they could be used for educational purposes to teach students about agro-ecosystem. But they have high livelihood services as farm owners & employees make their living from farm income & products. Birds were encountered in agro-ecosystems – they do have recreational & educational services. Forest has high recreational & aesthetic services, e.g. creative thinking when staying in it. It can also be used to teach about forest ecosystem.

Ecosystem Services walks and eco-awareness activities run by project partners with School Environment Clubs 2014-2016

In the project's three day Ecosystem Approach training for Ziway stakeholders in Oct. 2013, geography and environmental science teachers Solomon Kuluberhan and Muhammed Husein, who coordinate the Batu High School Environment Club in Ziway town, took part. The training covered:

- pesticide impacts on biodiversity
- ecosystem services
- basics of bird monitoring and identification

Afterwards, the teachers adapted the Club's work plan to multiply this training with students and other teachers from the school. They conducted their first ecosystem services walk around Lake Ziway shore with four students in Feb. 2014, as a trial run, slowly covering a distance of about 500m, with several stopping points. The response from students was so enthusiastic that the Club repeated this ecosystem services walk three times during the 2014 school year, with two different teachers and 40 students each time. Table 3 gives specific ecosystem services documented by Batu School Environment Club. Two further walks were organised in Oct 2015 with 40 students and 4 teachers, plus bird monitoring field trips around the wetland area with 50 students and 3 teachers. Club members have shared their new Ecosystem Approach knowledge with the entire school via 'mini-media' sessions, using drama, mobile phones and speeches to update the school assembly on environmental issues. Club activities on pesticide impacts included a mini-survey to find out the most commonly used pesticides by local vegetable growers and their hazard profiles.

Table 3. Ecosystem Services documented by Batu High School students, Ziway

Ecosystem services	Services identified
Provisioning	Most students recorded visible & widely known ones, e.g. fuel wood, food e.g. fish from the lake, also fibre from reed beds. Some saw beehives & recorded beekeeping as one source of food & income. Some mentioned medicinal plants.
Regulating	In addition to flood regulation, students were able to recognize the benefit of sitting underneath the shade of a tree during sunny days = micro-climate regulation. A few students recorded waste breakdown, pollination & population regulation.
Cultural	Almost all participants noted educational, recreational & aesthetic (inspiration from bird songs). Student Behailu Zeguaro shared how he sometimes walks along the lake shore when he wants to get peace of mind.

Supporting	Most noted primary production & nutrient cycling. A few mentioned soil formation: roles of dung beetles turning dung, and termites turning a log, into soil.

BOX 2: School Environment Clubs: a valuable tool for learning and community outreach

Project collaborator Institute for Sustainable Development (ISD) has worked with Ethiopian high schools for over a decade, leading activities to foster students' understanding of environmental and sustainability issues. These Clubs organize activities outside school hours with teaching staff and students who choose to take part. Activities include tree nurseries, compost making, managing kitchen garden vegetables without agrochemicals, awareness-raising about pesticide hazards and reviving pride in Ethiopia's diverse and unique cultural heritage.

ISD helped set up the Environment Club at Batu secondary school in Ziway town in 2013, with training and practical activities on tree planting and agro-ecological methods for growing food crops. The club currently has 135 members, of which 30 are teachers, comprising around 5% of the total school and staff population of around 2,500. The large number of members means not everyone can participate at once, so able students are selected as group leaders to receive initial training and then pass this onto their peers. One of the aims of the School Environment Clubs is to inform and influence parents, via their children and at school open days. The Ziway Club has raised wider awareness with more than 1,500 parents, through drama and musical activities. Many of the students' parents are involved in horticulture, either as smallholders or as farm workers in the Ziway area, which is well known for excessive pesticide use and hazardous practices. The training activities are one way to try and influence them for positive change, via the students. Ecosystem Service walks were demonstrated to Batu Club in Feb 2014 and offered as a potential future activity. Staff and pupils immediately reacted extremely positively and began to plan to programme in such walks to the Club's activity timetable.

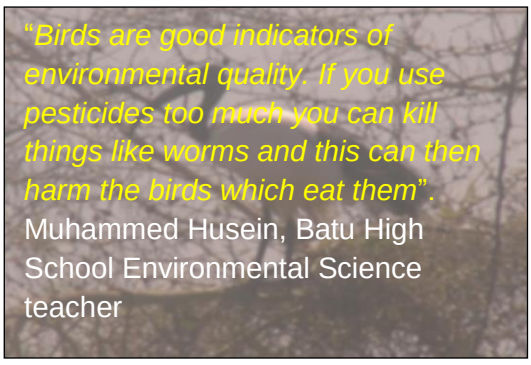
areas via bird diversity assessment, both Ziway and Arba Minch School Environment Clubs have started bird watching activities, with beginner-level 'monitoring' of diversity. The project provided each Club with a set of binoculars and a regional field guide to help with identification, with support from bird experts in the Ethiopian Wildlife & Natural History Association. In Ziway, selected final year students took part in the project biomonitoring component assessing abundance and diversity of aquatic invertebrates from the lake shore. They were trained to identify invertebrate groups to Orders and helped process and sort samples into 'like groups' for subsequent Family level ID by the team.

> *"It's useful to understand about these small organisms [e.g. aquatic inverts], they can be very useful in the environment, for example, you need microorganisms for a good healthy soil".*
>
> Abdo Fayiso, 10th year student, Batu High School, Ziway

D. Feedback from walkers

Post-walk individual evaluation forms and interviews with a few teachers and students show how interesting, valuable and relevant the School Environment Clubs have found doing the ecosystem services and bird identification walks.

Bird walks: What we've learnt: Bird identification was a new subject for most participants. They have been listing birds which frequently occur in their surroundings, learning their



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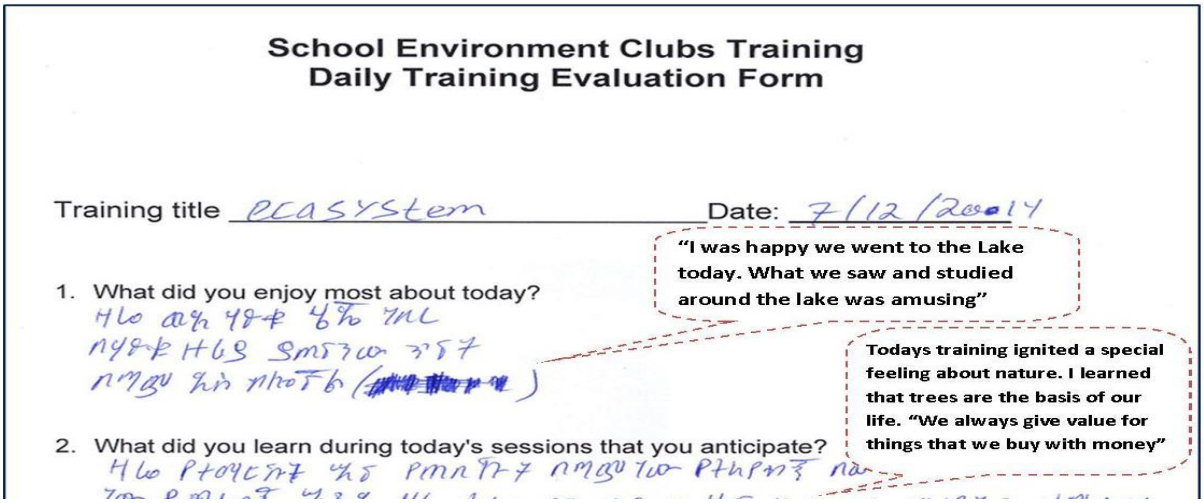
local and English language names. One participant counted more than 20 bird species in the school compound within 40 minutes. Ziway students were excited to spot an owl (one of 2 pairs of nesting Verreaux's Eagle Owls recorded in the school grounds) during the day time, which was new for their understanding.

How it's changed our thinking: Awareness raising exercises like this may have a great impact in changing people's attitudes on conservation of natural resources once they start to realize the invaluable benefits from nature. Most students said that they never gave much attention to the benefits people get from the environment before taking part in this activity. One said that "*I never realized that birds have benefits for human beings - birds were just things that fly around and feed on grains*". Teachers report that bird watching and recording species really helps open the students' eyes and leads them to admire nature.

Part of a student's feedback, Ziway High School Club.



School Environment Clubs Training
Daily Training Evaluation Form

Training title ecasystem Date: 7/12/2014

1. What did you enjoy most about today?

"I was happy we went to the Lake today. What we saw and studied around the lake was amusing"

Todays training ignited a special feeling about nature. I learned that trees are the basis of our life. "We always give value for things that we buy with money"

2. What did you learn during today's sessions that you anticipate?

Reflections on the value of doing ecosystem service walks: Teachers report that the walks are valuable as a way to reinforce practically some of the theory the students learn in Biology and Environmental Science classes. Solomon Kuluberhan explained how "*They help show how the environment provides us with many things and how we are part of it. It's the habitat for many animals and flora and bacteria and the habitats provide food chain services helping animals to reproduce. We benefit culturally too- for Oromia people, some of our annual celebrations involve locations around Lake Ziway and the lake is important for these*."

Expert evaluation of ecosystem service walks done in Ethiopia

Below are comments from the project ecotoxicology experts on how well the Ethiopian team were able to conduct ES walks as an awareness-raising approach and how these could be improved in the future.

What may have been missed:

-No practice session done with just the core team – would have been valuable in building knowledge and understanding of ecosystem services AND of how the walks work best in Ethiopia

-Some important ecosystem services missed, plus links between land use types & range of service benefits not always fully made to participants

How outcomes may have been improved:
-More handouts (examples of ecosystem services from different habitat types; recording sheets for walks)
-More time spent on practice in leading ecosystem service walks in different situations

Multiple benefits from land use & management:
-Ecosystem Service walks are an excellent way of emphasising link between land-use type (incl. differences between habitat types) and the range of benefits provided
-Important element in raising awareness of the value of agro-ecological approaches

E. Taking it forward

There are few written materials in Amharic or local language for the Clubs to use on the ecosystem services walks. While secondary school students all have reasonable, basic-level English, it is hard for them to fully understand some of the more conceptual aspects in a second language. Short guidance material on ecosystem services and step-by-step notes on the walk methodology in local language would make teachers and student group leaders more confident in helping Club members learn about and appreciate the less visible services, e.g. pollination, natural pest control, water purification, nutrient cycling.

The practicalities of planning and running Ecosystem Services walks are given in the project document **NR Group/PAN UK Guidance Note: *How to run an ecosystem services walk*** (PAN UK, 2016).

PAN Ethiopia's successful work in training small-scale cotton farmers in agroecological pest management and increasing their cotton yield, quality and income, while eliminating use of pesticides, is summarised in the leaflet Cotton without Highly Hazardous Pesticides (PAN UK, 2017) via: http://www.pan-uk.org/cotton/

Background information for the ecosystem services training walk held at Commonwork, Kent, in 2013

Fig. 1 Linkages between ecosystem services & human wellbeing

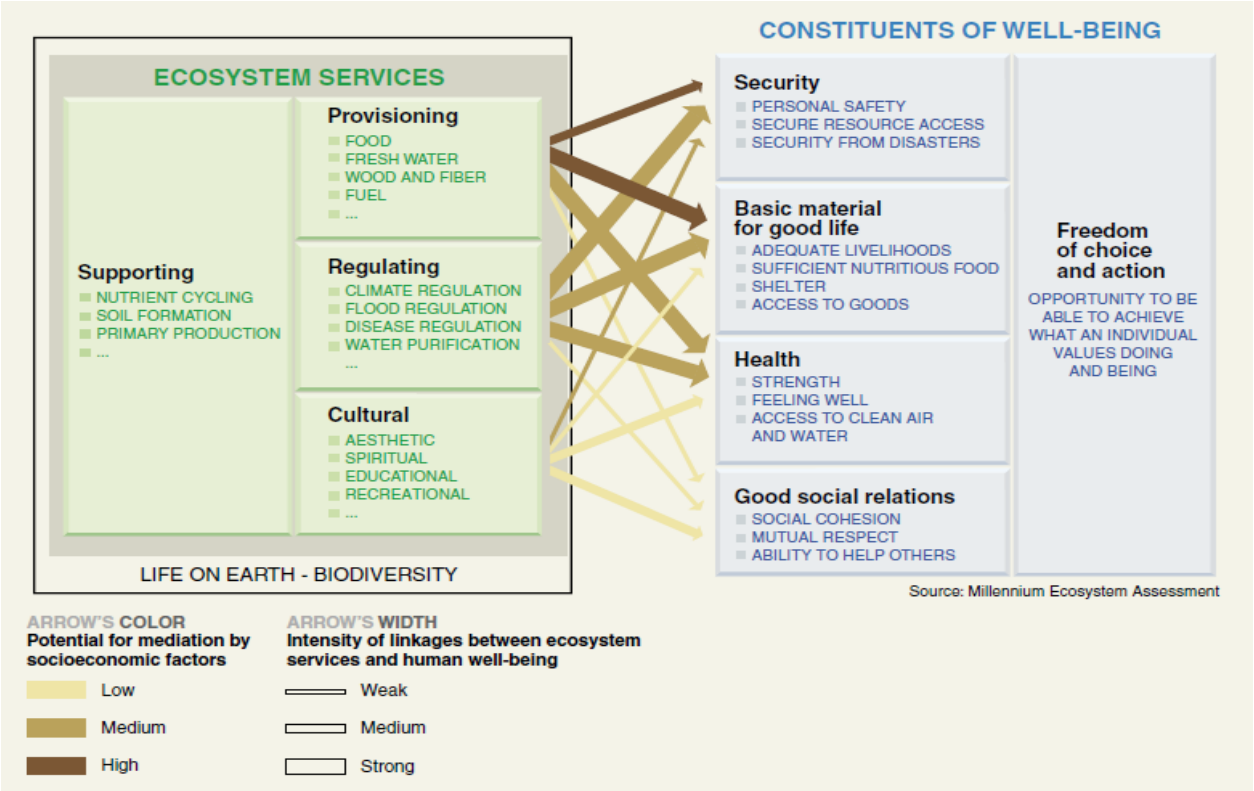


Figure 1. Ecosystems and Some Services They Provide

Different combinations of services are provided to humans from the ecosystems represented here. Their ability to deliver the services depends on complex biological, chemical, and physical interactions, which are in turn affected by human activities.

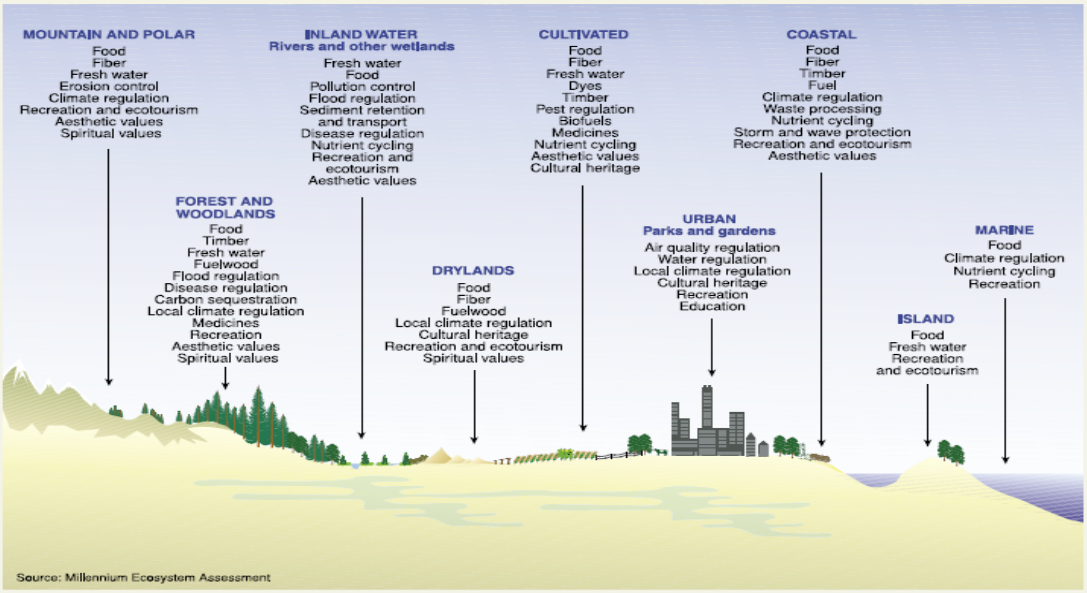


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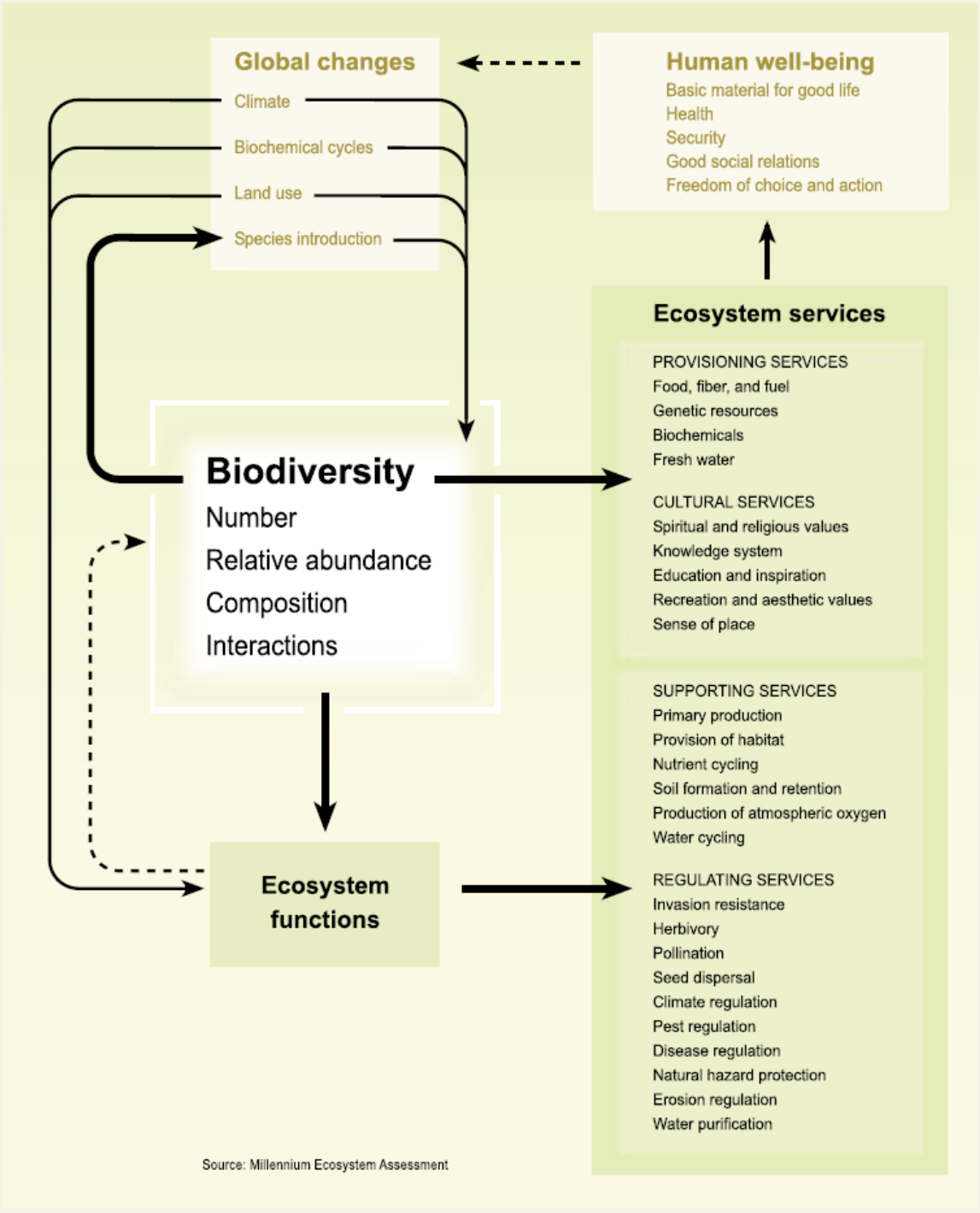
Figure 1.4. BIODIVERSITY, ECOSYSTEM FUNCTIONING, AND ECOSYSTEM SERVICES (C11 Fig 11.1)

Biodiversity is both a response variable affected by global change drivers and a factor modifying ecosystem processes and services and human well-being. Solid arrows indicate the links that are the focus of Chapter C11.



Source: Millennium Ecosystem Assessment

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Example Ecosystem Service Walk record sheet (part only)

Commonwork Ecosystem Services Walk - 22nd August 2013

Please record all the benefits you sense as you walk Name:

Location	Ecosystem Services			
	Provisioning services	Regulating services	Cultural services	Supporting services
1. Grow2Grow plot and Market Garden				
Walk to 2				
2. The Park - Pasture				
Walk to 3				
3. Mount Wood – woodland shaw				
Walk to 4				
4. Woodland edge				
Walk to 5				

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