

OSPAR Guidelines on the reduction of marine litter through Sustainability Education Programmes for fishers (OSPAR Agreement 2019-08)

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1. Definitions/Glossary

In the context of these guidelines, the following terms are used:

Attitude: A way of thinking or feeling about someone or something, typically one that is reflected in a person's behaviour.

Behaviour: The way in which one acts or conducts oneself.

CFP: Common Fisheries Policy (European Commission)

Fisher (plural fishers): Person working in the fishing industry

Fish Stock Assessment: A stock assessment is a way of calculating the abundance of a certain fish species in the sea.

Fishing for Litter: Initiative that aims to reduce marine litter by involving one of the key stakeholders, the fishing industry. Participating vessels are given hardwearing bags to collect marine litter that is caught in their nets during their normal fishing activities.

IMO: International Maritime Organization

KIMO: Local Authorities International Environmental Organisation

Marine environmental awareness: Awareness is knowledge and understanding that is processed and incorporated into an individual's thinking and has consequences for his/her attitude. Marine Environmental Awareness focusses on the contribution of the human element to the prevention of pollution and a sustainable maritime industry.

Marine Litter: Any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment.

MARPOL: International Convention for the Prevention of Pollution from Ships

Ocean Literacy: Understanding the ocean's influence on you and your influence on the ocean.

RAP: The OSPAR Regional Action Plan for Prevention and Management of Marine Litter in the North-East Atlantic

School curriculum: The educational programme including subjects studied in a school, and what each subject includes.

STCW: International Convention on Standards of Training, Certification, and Watch keeping for Seafarers

STCW-F: International Convention on Standards of Training, Certification, and Watch keeping for Fishing Vessel Personnel

Sustainability: Meeting the needs of the present without compromising the ability of future generations to meet their own needs, often seen as the triple P concept – the simultaneous pursuit of economic prosperity (profit), environmental quality (planet) and social acceptance (people).

Sustainable development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs, often seen as the triple P concept –the simultaneous pursuit of economic prosperity (profit), environmental quality (planet) and social acceptance (people).

Sustainable fishing: A sustainable fishing industry.

“Sustainability education programmes for fishers” means all training, workshops and other educational programmes that provide knowledge and understanding of sustainable fishing and its contribution to the reduction of marine litter.

2. Introduction

OSPAR has adopted the commitment to substantially reduce marine litter in the OSPAR maritime area, by 2020, to levels where properties and quantities of marine litter do not cause harm to the coastal and marine environment. The Regional Action Plan for Prevention and Management of Marine Litter in the North-East Atlantic (RAP) sets out the policy context for OSPAR's work on marine litter. The RAP describes the various types of actions that OSPAR is working on, considering both land-based and sea-based sources of marine litter. In addition to the prevention and reduction of litter pollution, and the removal of existing litter, one of the objectives of the RAP is to enhance knowledge and awareness of marine litter.

Recommendation 2019/01 on the reduction of marine litter through the implementation of sustainability education programmes for fishers was adopted at the OSPAR Commission meeting in Dordrecht in 2019.

The purpose of the Recommendation is to reduce marine litter by promoting the implementation of sustainability education programmes for fishers including addressing the social, economic and ecological impacts of marine litter. This will inspire and assist Contracting Parties and fishing education bodies, their teaching staff and other experts to implement sustainability training for fishers, with the ultimate goal to offer basic sustainability training for all fishers, and, to implement sustainability as a structural element in the education of future fishers in the OSPAR region with the aim to empower (future) fishers to protect fish stocks and the sea environment for future generations. The training course aims to help (future) fishers find a balance between planet (environmental challenges), profit (economic viability), and people (acceptance of your business by society – a license to operate) in shaping their sustainable and successful businesses.

3. Background

3.1. OSPAR monitoring of marine litter

According to the data from the OSPAR beach monitoring, it is apparent that fishing is one of the main sources of litter. The composition of marine litter found in the OSPAR Maritime Area for the period 2014 – 2015 was 15%-30% fisheries-related. In the RAP, marine litter from fishing is identified as a key area for action, and two actions are specifically aimed at the education of fishers:

- OSPAR Action 58: Develop marine litter assessment sheets to assist Contracting Parties in developing material for education programmes, including those for professional seafarers and fishers.
- Contracting Parties National Action 79: Promoting or adopting environmental awareness courses for fishers and the fishing sector.

3.2. The need for education for fishers

The need for education on marine litter for fishers is part of a broader concept of being a fisher in a changing world. Being a fisher today is different than 10 or 20 years ago. The job has changed due to increasing costs, more regulations, farmed fish products on the market and a higher demand for

responsible and sustainable fish products. In addition, our seas are used for more than fishing alone, so fishing grounds are under pressure. Also, and partially as a reaction to these developments, the fishing sector itself has experienced large changes in the past 10 years, such as new fishing techniques and more market-focused thinking. To continue to successfully operate in a changing society and the changing fishing sector, competences of those working in the sector need to evolve and grow.

For the fishing industry to develop sustainably, fishers need additional skills, knowledge and information. The way society perceives the environmental consequences of fishing is changing and fishers are operating today in a world with multiple stakeholders. For many fishers, accepting these changes is difficult, and embracing the need for sustainable development is even more challenging. Consequently, a sound process of including sustainable fishing training in the education of fishers would benefit fishers, the fishing sector and the marine environment in general.

This is where sustainability education and marine environmental awareness training comes in. Sustainability education addresses marine ecology and the role of fishing in the marine ecosystem. It provides knowledge and understanding of current issues, such as fish stock assessment, marine litter, climate change, certification schemes, cooperation within the fish supply chain, and enhances communication skills.

The issue of marine litter is a very relevant and practical aspect of sustainable fishing and should be addressed as an integral part of sustainability education. Marine litter education addresses the contribution of the fishing industry to the problem, the (changing) attitude of fishers towards marine litter, and, projects like Fishing for Litter where the fishing industry contributes to solutions for the problem. However, marine litter education will be more successful when it is part of the broader concept of sustainable development of the fishing industry. Changing attitudes and behaviour of (future) fishers towards marine litter requires a comprehensive approach towards sustainability.

3.3. IMO Marine litter Action Plan

Recognizing that more needs to be done to address the environmental and health problems posed by marine plastic litter, IMO Member States meeting in the MEPC agreed actions to be completed by 2025, which relate to all ships, including fishing vessels. This IMO Action Plan to addresses marine plastic litter from ships includes, amongst others, the reviewing of provisions related to the training of fishing vessel personnel and familiarization of seafarers to ensure awareness of the impact of marine plastic litter. More specifically the measures include:

- consider ways to promote the work of IMO to address marine plastic litter generated from ships;
- consider reviewing fishing vessel personnel training to ensure that all fishing vessel personnel, before being assigned any shipboard duties, receive basic training on marine environment awareness oriented on marine plastic litter including abandoned, lost or otherwise discarded fishing gear; and
- consider amending the IMO model course on environmental awareness to specifically address marine plastic litter.

As such it aligns with the OSPAR Recommendation. (ref.

<http://www.imo.org/en/MediaCentre/PressBriefings/Pages/20-marinelitteractionmecp73.aspx>)

3.4. Marine environmental awareness training in the shipping industry

The International Maritime Organization (IMO) sets training standards for seafarers on merchant ships in the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). In 2010, with the revision of the STCW Code, IMO included that seafarers should gain knowledge and awareness of the prevention of pollution in the marine environment.

The Dutch Ministry of Infrastructure and Environment¹ submitted an IMO model course 'marine environmental awareness' (MC 1.38), that was accepted by the IMO in 2011. This two-day course actively involves (future) seafarers in the subject of sustainable shipping and forms a concrete basis for knowledge and awareness of the marine environment in the prevention of pollution as prescribed in the STCW Code. The model course that was submitted by The Netherlands is based on the experience of the ProSea Foundation, a Dutch non-profit organisation that specialises in educating maritime professionals.

3.5. Sustainability education for fishers in the Netherlands

With the sustainable shipping courses as an inspiration, the ProSea Foundation started working with the Dutch fishing sector, scientific institutes and teachers from fishing education bodies to develop a sustainable fishing course for students of education bodies. After a test run with and for all fishing teachers, the first four-day sustainability in fishing course for fishing school students (future fishers), called 'fishing with a future' was organised in 2004. Over the years, the course content has become more and more part of the school curriculum and fishing school teachers have been including elements of the course in their own teaching. In 2011, the entire course content was included in the official fishing school curriculum and teaching materials, and in 2017, in close cooperation with the fishing sector and the Ministry of Economic Affairs, the course content was included in the newly developed website 'Vistikhetmaar' (translated as 'I_fish I_knew').

While it has become a normal element of the school programme, and teachers are using elements of the course in their own programme, ProSea is still brought in as experts to organise and teach this special part of the school programme. The next step in implementation in the Netherlands is to transfer that responsibility to the teachers and, together with the schools and the Ministry of Infrastructure and Water Management, ProSea is looking into the best way to do this (for example by organising train the trainer programmes).

In addition to the courses for the fishing students, ProSea also develops and conducts courses for future leaders in the industry, practicing fishers and fish vendors.

4. These guidelines

These guidelines are designed according to the situation in the Netherlands and Belgium but are presented in such way that all Parties to OSPAR should be able to use them as described or to add relevant parts to their own educational programme. This document describes the guidelines for sustainability education as a whole (for both active fishers and future fishers and including the topic of marine litter), while recognizing that the OSPAR recommendations deals with reduction of marine litter through education (see section 5.7).

¹ Recently renamed to Ministry of Infrastructure and Water Management consequential to the establishment of a new parliament

The guidelines describe two programmes:

- A short programme about sustainable fishing for all fishers.

This programme can be used as part of the basic training of all fishers. This one-day programme gets participants acquainted with the general concept of sustainability as a balance between planet (environmental challenges), profit (economic viability), and people (acceptance of your business by society – a license to operate), with a focus on marine litter.

Several OSPAR countries do not offer formal professional education for fishers. This short course can also serve as a blueprint for sustainable fishing training for fishers in these countries.

- A sustainable fishing course programme for fishing education bodies

This four-day programme for fishing education bodies addresses the wide scope of sustainability education as a balance between planet (environmental challenges), profit (economic viability), and people (acceptance of your business by society – a license to operate). It includes marine ecology and the role of fishing in the marine ecosystem and provides knowledge and understanding of current issues, such as fish stock assessment, marine litter, entrepreneurship, climate change, certification schemes, cooperation within the fish supply chain, and enhances communication skills.

Chapter 5 of these guidelines describes the scope (5.1), general objectives (5.2), target group (5.3) and some general requirements (5.4-5.6) of both courses. It also describes several important aspects of the implementation of sustainable fishing training that need to be considered when customizing the courses for different countries (5.7).

After the general description for both courses, more specific guidelines are given in 5.8 (short course) and 5.9 (full course for fishing education bodies).

Suggested examples of the courses can be found in more detail in attachment 1 (short course) and attachment 2 (full course). Finally, a more elaborate description of general course didactics is included in attachment 3 and additional information for the instructor on the coverage of subjects and workshops in the four-day course in attachment 4.

5. Course implementation

5.1 Scope

The purpose of both courses is to inspire and assist Contracting Parties, fishing education bodies and training institutes, their teaching staff and other experts to introduce and implement sustainable fishing training for all fishers (both active fishers and future fishers) with the goal to implement this as a structural element in the education of fishers.

The training courses comprises of a wide variety of teaching methods, including interactive lectures, video's, animations, workshops, group assignments, games, quizzes and presentations. Overall, the course has three main elements:

- Content and theory – background knowledge and current information
- Communication and presentation skills – hear, see, then practice, and practice again

- Opinion forming and future thinking – learn how to develop personal opinions and to think about the future of fishing

These main elements are described in more detail in attachment 3.

5.2 General objectives

Although the two courses vary in length, the general objectives of the courses are the same. More detailed objectives can be found in attachments 1 and 2.

The general objectives are: Those who have successfully completed the course will:

1. realize that commercial fishing is much more than catching as many fish as possible;
2. realize that working towards sustainable fishing is an important part of a successful fishing sector now and in the future;
3. be able to demonstrate knowledge and understanding of several aspects of sustainable fishing, including but not limited to the issue of marine litter;
4. realize that the modern fisher profession involves interaction with other fishers and with the world surrounding the fishing sector;
5. understand the importance of a positive reputation of the fishing sector;
6. be able to point out (some) personal responsibilities and activities that have a positive influence on (different aspects of) a sustainable fishing company and sector.

5.3 Target group

The target group for sustainability education in the OSPAR region comprises of all fishers (both active fishers and future fishers). The short programme can be used as part of the basic training of all fishers. In addition, it can serve as a blueprint for sustainable fishing training for countries without formal education of fishers. The four-day workshop is specifically designed for future fishers at fishing education bodies.

The maximum number of course participants in the course should depend on course setup and the facilities and equipment available, bearing in mind the aims and objectives of this course.

5.4 Course certificate

On successful completion of the course appropriate documentary evidence is required to be issued to the course participant.

5.5 Staff requirements

The instructor in charge shall have experience with working with the target group, has had training and/or equivalent knowledge in the subject matter of this course, or will work together with knowledgeable external experts. This knowledge includes but is not limited to sustainable fishing, the marine environment, fishing economy, the fish supply chain, fisheries management, communication and environmental aspects of fishing.

5.6 Teaching facilities and equipment

For the theoretical part of the course, a classroom equipped with presentation facilities and audio-visual materials is recommended. For the workshops, enough space should be available to facilitate group work, preferably in separate rooms. Enough materials should be available to enable groups to present their results (flipchart, overhead projector, power point or other means of visual presentation).

5.7 The importance of customizing the courses

The specific description of the courses in the attachments is based on the extensive experience with Dutch sustainable fishing course programmes for fishing education bodies and for active fishers. It works for fishers in the Netherlands in the context of the Dutch fishing industry and for Belgium.

It is essential to recognize that the fishing sector in every Contracting Party is different and unique in many aspects. Setting up sustainable fishing training for fishers in different countries requires that the course should be adjusted to the specific situation for that country or region, and adjusted to education level, language, culture, specifics of the fishing sector and the local environment. For a successful implementation of the sustainability education courses for fishers it is important to take into consideration that:

- Sustainable Fishing training entails all aspects of sustainability: planet (environmental challenges), profit (economic viability), and people (acceptance of your business by society - a license to operate).
- The fishing industry is regional/local and often unique. Even within a country, the variation on fishing methods and regional/local circumstances is stunning. Developing a course for the fishing industry means that all those subjects need to be customised and adjusted to not just national, but regional/local circumstances. Therefore, there should be not one international but a country-specific approach to the design of the education programme.
- Fishing communities are often small and being a fisher has a large cultural component. It is essential to strike the right tone and take the cultural aspects of the fishing community in account.
- Traditionally, the relationship between fishers and environmental organisations has been difficult. Implementing a course about sustainable fishing requires a thorough process that is based on respect for their profession, building trust and stay away from blaming, as much as, transferring course content. It is important that the course inspires the participants.
- The level of training and education of fishers is often limited to high school and/or vocational training, and they may speak limited or no English. This has important implications for the course that includes new and conceptual subjects like fish stock management or economics. The course language needs to be their native language, and, the information level needs to be customised.
- Fishers on a small vessel do not need a very extensive education to be able to work in the fishing industry and often do not attend a fishing academy. Working on vessels larger than 24 meters does require more extensive education, but since fishing fleets are often small, in most countries there are only a few fishing education bodies with a limited number of students. Therefore, the education bodies have limited budgets for the development of new materials and the inclusion of new subjects like sustainable fishing. Furthermore, it is difficult to encourage human resources to teach materials outside of the legal requirements.

5.8 Implementation of the one-day course

The short course is a one-day introduction to sustainable fishing. This one-day programme gets participants acquainted with the general concept of sustainability as a balance between planet (environmental challenges), profit (economic viability), and people (acceptance of your business by society – a license to operate). The programme focusses on the issue of marine litter and addresses the contribution of the fishing industry to the problem, the (changing) attitude of fishers towards marine litter, and, projects like Fishing for Litter where the fishing industry contributes to solutions for the problem.

According to the STCW-F Code from IMO, protecting the environment is one of the requirements of the basic training of all fishers. This one-day programme can be used as part of the basic training of all fishers.

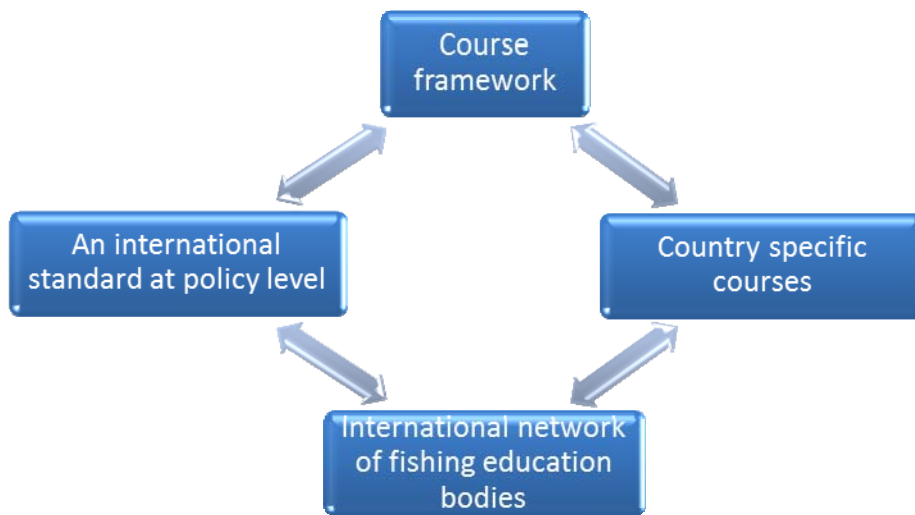
- While the focus of STCW-F is on environmental issues, this one-day course puts these issues in the context of current developments and the importance of a sustainable future for the fishing industry.
- In some countries, basic training is the only formal education for fishers. In those cases, it is the only opportunity for the implementation of sustainable fishing training.
- The basic training is offered to fishers by training institutes or fishing education bodies. It is essential for the implementation of this programme to work together with these institutes.

A more detailed description of the short course is included in attachment 1.

5.9 Implementation of the four-day course

The implementation of marine environmental awareness training in the shipping industry can serve as a blueprint for the implementation of sustainable fishing training at fishing education bodies. Within 15 years, the Dutch initiative to develop a marine environmental awareness course for a Dutch shipping academy in 1999, has led to the development of an international course for shipping education bodies in northern Europe (2002), courses for all shipping education bodies in the Netherlands (2008), courses in the Philippines (2010), and finally, the development of the IMO model course (2011). However, compared to shipping, sustainable fishing includes a much wider variety of subjects, such as fishing methods, economics, fish stock assessment, certification schemes, environmental issues, license to produce and communication skills.

Given the special challenges for the implementation of sustainability education at fishing education bodies as described in 5.7, an important aspect of the implementation process is the building of a national network of partners that work together in customizing the course content for their country, and the execution of pilot courses in different countries to gain hands-on experience. The course framework (as described in these guidelines) and the country specific courses in the different countries are important elements of the implementation strategy. Existing programmes that include elements of sustainable fishing and marine litter in OSPAR Contracting Parties should be considered. The experiences from separate countries, when brought together in an international network of fishing education bodies, serve as a firm foundation for the more formal setting of an international standard for sustainable fishing training at the policy level that, in its turn, will also set the standard for a new course framework.



A more detailed description of the full course is included in attachment 2. In addition, a more elaborate description of general course didactics is included in attachment 3 and additional information for the instructor on the coverage of subjects and workshops in the four-day course in attachment 4.

Attachment 1: One-day programme Sustainable Fishing and Marine Litter

The attachments are developed according to the situation in the Netherlands and Belgium (see chapter 5.7 in the guidelines).

1.1 Course content

The following elements should be represented in the 1-day programme about sustainable fishing

- Sustainable Fishing
- General overview of relevant aspects of the 3 P's of sustainability (People, Planet, Profit)
- Working in a changing fishing industry
- The marine environment
- The environmental issue of marine litter
 - Causes
 - Problems
 - Solutions
- Personal responsibility

1.2 Specific learning objectives

All detailed learning objectives are understood to be prefixed by the words: "After completing this course the course participant will be able to"

Sustainable development and changes in the fishing sector

- Define sustainable development as a balance of three P's - People, Planet, Profit, where all three P's get sufficient attention
- Name several practical examples of sustainable fishing initiatives in the fishing sector
- Explain why the sector works towards sustainable fishing
- Name the main changes in the fishing sector in the last 15 years
- Explain the economic context of recent development in the fishing sector, such as cost reduction and the use of other fishing techniques
- Recognize that successful fishers are entrepreneurs
- Express an opinion about these changes in the fishing sector

Marine environment

- Describe why the oceans are important for all people worldwide, including,
 - Name the importance of the oceans as a source of food
 - Name the importance of the oceans as a source of oxygen
- Describe basic principles of marine ecology and the production of fish
 - Explain the role of phytoplankton as the primary producer (photosynthesis)
 - Give an example of a food chain with phytoplankton at the base
 - Recognize that food chains are connected in food webs
 - Recognize that all large sea life, including fish, depends on the small sea life (phytoplankton, zooplankton and bacteria)

Planet P - Environmental challenges

- Name the main environmental challenges connected to fishing including climate change and the impact of global warming on fisheries
- Describe the environmental and economic impact of plastics in the marine environment, including the plastic soup, entanglement, ingestion and microplastics and marine litter as a vector for nonindigenous species
- Recognize the role fishers can play in decreasing the amount of plastics in the ocean, including proper garbage handling on board and disposal in harbours, use of materials, recycling of fishing nets and participation in the Fishing for Litter initiatives
- Recognize that they personally can contribute to solutions for environmental challenges

Attachment 2: Four-day course Sustainable Fishing

2.1. Course content

The following elements should be represented in the sustainability education programme for fishers:

- Sustainable Fishing – 3 P's of sustainability (People, Planet, Profit)
- Marine Environment, ecology, and diversity of marine areas
- Fishing economics and entrepreneurship
- The fish supply chain
- Fishing and fishery management, including impacts of different fishing techniques on the marine environment and EU regulations
- Environmental challenges (oil, solid waste (marine litter) and air emissions),
- Reputation and societal acceptance;

The content of these subjects is described in more detail in the specific guidance notes on the course content (attachment 4).

2.2. Course outline and timetable

The sustainable fishing training course comprises of a wide variety of teaching methods, including interactive lectures, video's, animations, workshops, group assignments, games, quizzes and group presentations. Sustainable fishing training covers a wide variety of subjects and these guidelines offer a basis for the development of sustainable fishing training at fishing education bodies.

It describes a four-day training programme:

- **Day 1:** Sustainability (not just focussing on profit, but a balance between the three P's: People, Planet and Profit) and marine environment/ecology (planet P)
- **Day 2:** Profit P and People P
- **Day 3:** Fisheries, fishery management and People P - continued (communication skills)
- **Day 4:** Environmental challenges (planet P) and sustainability futuring

Day 1	Day 2	Day 3	Day 4
<ul style="list-style-type: none"> Introduction sustainability: what is it? Why we talk about it? Workshop: own opinion about important sustainability issues Marine Environment and ecology: lecture and field trip to local marine area/beach clean up 	<ul style="list-style-type: none"> The fishing fleet: developments, past 20 years and current trends Fisheries economy: how to earn money with fishing and the fish supply chain Workshop Image and Identity: acceptance by society 	<ul style="list-style-type: none"> Fisheries impacts and fishery management: lecture and exercises Game: tragedy of the commons People P – communication skills (theory and role-playing exercises with an actor) 	<ul style="list-style-type: none"> Environmental challenges: oil, marine litter and air emissions Final assignment: workshop on the future of ships, fishing techniques, cooperation in the fish supply chain and environmental behaviour presentations of sustainable future plans

Day 1: Sustainability, the Sea (theory and practice)

Time	Activity	By
9.00	Introduction Sustainable Fishing – 3 P's of sustainability (People, Planet, Profit)	Facilitator
9.30	Group assignment (TOP 5)	
10.00	Group presentations (TOP 5)	
10.30	Break	
10.45	Marine Ecology or ... how does the sea work? Diversity, special local areas	Facilitator and local expert
12.00	Lunch	
13.00	Excursion to local 'sea area' or beach clean up	Local expert
16.00	End of day 1	

Day 2: Fishing economy (profit P) and Societal acceptance (People P)

Time	Activity	By
9.00	The fishing fleet in my country	Facilitator and local expert
10.15	Break	
10.30	Profit P <ul style="list-style-type: none"> – Fishing as a business (making money) – The fish chain – Economy and sustainability 	Facilitator and local expert
12.00	Lunch	
13.00	Profit P – part 2	Facilitator and local expert
14.00	People P	Facilitator

	- Societal acceptance - Image of fishing	
16:00	End of day 2	

Day 3 – Fisheries Management (Planet P), Communication (People P)

Time	Activity	By
9:00	Fisheries and fishery management <ul style="list-style-type: none"> - Impacts of fisheries (fish stocks, seabed disturbance, bycatch) - Who owns the fish? - About fishing effort, mesh size, catch rates - Fishing management - Fish stock assessment 	Facilitator and local partner
10.30	Break	
10.45	Fisheries management – part 2	Facilitator and local partner
12:00	Lunch	
13.00	PEOPLE P – Communication	Facilitator and local partner
16:00	End of day 3	

Day 4 - Environment (Planet P), marine litter workshop, Final workshop

Time	Activity	By
9.00	Environmental challenges <ul style="list-style-type: none"> - Climate change and other air emissions - Oil and marine litter 	Facilitator
10.30	Break	
10.45	Workshop – marine litter solutions	Facilitator
12.00	Lunch	
13.00	<i>Back to the future</i> – close out workshop	Facilitator
15.00	Group presentations	Students
16.00	End of course	

2.3. Specific learning objectives

All detailed learning objectives are understood to be prefixed by the words: “After completing this course the course participant will be able to”

Opening lecture and workshop – sustainable fishing

- Name the main changes in the fishing sector in the last 15 years
- Define sustainable development as a balance of three P's - People, Planet, Profit, where all three P's get sufficient attention
- Name several practical examples of sustainable fishing initiatives in the fishing sector
- Explain why the sector works towards sustainable fishing

Workshop TOP 5

- Express an opinion about challenges (problems) for a sustainable fishing sector
- Relate his/her opinion to the opinions of other course participants

Marine environment

- Describe why the oceans are important for all people worldwide, including,
 - Name the importance of the oceans as a source of food
 - Name the importance of the oceans as a source of oxygen
- Describe basic principles of marine ecology and the production of fish
 - Explain the role of phytoplankton as the primary producer (photosynthesis)
 - Give an example of a food chain with phytoplankton at the base
 - Recognize that food chains are connected in food webs
 - Recognize that all large sea life, including fish, depends on the small sea life (phytoplankton, zooplankton and bacteria)
- Explain that coastal seas and open ocean are different in diversity and abundance of sea life, and, production of fish
- Describe the local (coastal) sea, both as fishing grounds and as an area for sea life other than commercially interesting species
 - Describe the area
 - List commercially interesting species
 - Recognize diversity of marine life that live there (other than fish)
 - Give an example of a food chain in this area
 - Give an example of the importance of the area for humans

Fishing economics

- Recognize the development of the fishing fleet in the last 10-50 years regarding size (number of ships) and engine power
- Explain the economic context of recent development in the fishing sector, such as cost reduction and the use of other fishing techniques
- Explain the economics of fishing in general, including all costs and proceeds associated with operating a fishing vessel
- Realize that making money as a fisher not only depends on the amount of fish you catch
- Explain the steps in the fish supply chain (the way fish travels from fishers to consumer)

- Name the partners and their roles in the fish supply chain
- Recognize that successful fishers are entrepreneurs

Fishery management

- Recognize impacts of fishing on the marine environment, including seabed disturbance and effects of fishing on fish stocks
- Explain what fishery management is and explain why it is necessary (Tragedy of the Commons)
- Recognize that rules for fishing are not only made in one country, but in a European context (and sometimes even worldwide)
- Recognize that scientists, governments, fishers and NGO's have different roles in fishery management
- Recognize central themes of the Common Fisheries Policy from the EU, such as technical measures, marine protected areas, fish stock assessment, Maximum Sustainable Yield (MSY) and the landing obligation
- Recognize that fish stocks are variable, and that both nature and humans play a role
- Explain why fish stocks may increase or decrease (fish growth, reproduction, natural mortality and fisheries)
- Explain the connection between fishing effort, total catch and fish stock size
- Be willing to try to read publications about fishery management (for example policy briefs from the government and articles from scientists in fishery news) and/or be willing to participate in research projects in the future

Environmental challenges

- Name the main environmental challenges connected to fishing
- Describe the environmental and economic impact of oil in the marine environment, including the effects of oil on sea birds
- Describe the environmental and economic impact of plastics in the marine environment, including the plastic soup, entanglement, ingestion and microplastics
- Recognize the role humans play in causing climate change
- Describe potential impacts of climate change, including effects on temperature, weather events, sea level and the marine environment
- Name solutions for the environmental issues of oil, marine litter and climate change
- Recognize the role fishers can play in decreasing the amount of plastics in the ocean, including proper garbage handling on board and disposal in harbours, use of materials, recycling of fishing nets and participation in the Fishing for Litter project
- Recognize that they personally can contribute to solutions for environmental challenges

People P

- Acknowledge that many players (stakeholders) are interested in the fishing sector, including governments, NGOs and consumers
- Recognize the connection between developments in the fishing sector and societal interest
- Describe his/her views on the image of fishing; how other people see the fishing sector

- List three factors that influence the image of fishing
- Give an opinion about the importance of a good reputation or image
- Name examples how the fishing sector can improve their reputation or image
- Recognize the importance of good communication in improving the image of the fishing sector

Communication

- Recognize the importance of communication
- Demonstrate basic communication skills, including non-verbal communication and listening to others
- Be willing to talk to people with a different opinion

Final workshop

- Express ideas about the (sustainable) future of the fishing industry
- Recognize his/her personal responsibility towards the environment
- Prepare a presentation about (an aspect of) the future of the fishing industry
- Demonstrate basic presentation skills

2.4. Teaching aids/OL tools

- Video 'Adverse effects of oil on plankton'
- Video 'Albatross ingestion of plastics'
- Video 'Plankton munching microplastics'
- Video 'Invaders from the sea'
- Video 'Importance of the ocean'
- Video 'Will it sink, or will it float?'
- Illustrations 'Who is the best fisher?'
- Video 'Marine Spatial planning in the North Sea'
- Animation 'EU Common Fisheries Policy'

Attachment 3: Instructor manual on course didactics

This attachment describes notes and tips on general course didactics for both the one-day programme and the four-day course. This manual reflects the views of the course developers with respect to methodology and organization as well as what they consider important considering their experience as instructors of this course. The description is based on the Dutch sustainable fishing course programmes for fishing education bodies and for active fishers. It works for fishers in the Netherlands in the context of the Dutch fishing industry.

It is essential to recognize that the fishing sector in every Contracting Party is different and unique in many aspects. The guidance given is intended to give the instructor an operational baseline to develop a course that will meet the local requirements and to use the instructor's own experience and ideas. Setting up sustainable fishing training for fishers in different countries requires that the course should be adjusted to the specific situation for that country or region, and adjusted to education level, language, culture, specifics of the fishing sector and the local environment. This manual is therefore to be used as a starting point and inspiration, and not as a strict blueprint.

Course elements

The training course comprises of a wide variety of teaching methods, including interactive lectures, video's, animations, workshops, group assignments, games, quizzes and presentations. Overall, the course has three main elements:

- **Content and theory**

Knowledge is power. Participants get current and independent information about all aspects of sustainability. Educational methods used are presentations by course leaders and experts, combined with Q&A sessions, excursions and video material

- **Communication and presentation skills**

Communication and presentation skills are crucial for successful implementation of knowledge and awareness gained in course, as well as, for cooperation, sharing ideas, and discussing important issues. Skills include participating in group work, personal conversations and discussions (talking with someone you disagree with) and presentations. Educational methods used include demonstrations, discussions, practice and practice some more (communication exercises and presentations).

- **Opinion forming and future thinking**

Enable individual participants to process information and challenge them to develop an opinion about (aspects of) sustainable fishing, and to think about the (sustainable) future of the fishing industry. Educational methods include assignments, group work, workshops and exchange of opinions.

Theory

Sustainable fishing requires knowledge of sustainable development, the marine environment, fishing economy, the fish supply chain, fisheries management, communication and environmental aspects of fishing. Theory gives course participants a better understanding of a wide variety of subjects relevant to

sustainable fishing. Theory can be taught as classroom lectures, preferably supported by expert speakers, video's, pictures and visual presentations.

Tips to present theory:

- Relate subjects to situations, which are familiar to participants
- Use enthusiastic presenters
- Ask questions, as this makes course participants think about the issue
- Encourage course participants to ask questions themselves and to interact during the lectures
- Some points are more important than others and should be emphasized. To ensure that such points are remembered, they must be restated a number of times, preferably in different words
- Reiterate things that are complex – don't worry about repeating information. Find more than one way to get a point across. If someone doesn't understand the first time, you can word it differently and it might be clear the second time (or the third time). Simple analogies are good. Ask if the audience understood the principle

Workshops

The objective of the course is to achieve awareness of the importance of sustainable fishing, stimulate personal involvement, a sense of personal responsibility and commitment to contribute to sustainable fishing.

Awareness and involvement require more than knowledge and theory. To achieve awareness and to instigate a thinking process, the course developers have included several workshops for small groups of course participants. These workshops are seen as essential to achieve awareness. The assignments are designed to give course participants structured time to think about and process the information acquired through the theoretical lectures and movies.

In addition, during the workshops course participants are asked to voice their ideas and opinions, to listen to the opinions of other course participants and to think about their own role and responsibilities. The course developers stress the importance that course participants are given time and space to share their ideas and opinions. In many cases there is not "one solution" and sharing different ideas and opinions about different aspects of sustainable fishing gives the course participants a chance to develop their personal views and sense of responsibility.

Tips for leading workshops:

- Create an "open atmosphere" to lower the threshold to participate
- At the start of the workshop, make sure all groups understand the assignment
- All course participants bring their ideas and opinions to the room. Allow them to share these to add to the value of the workshop
- Give groups enough time to work on the assignments at their own pace. Sharing ideas and opinions takes time
- Do not allow individual members to monopolize the group activity, but ensure that all members have a chance to express opinions and ideas

- Do not steer the group in the direction you want by superimposing your opinion. Giving suggestions (have you thought about?) is often more helpful. In achieving awareness, the thinking process is just as important as the end result
- Be prepared to get some unexpected results – some results you might not agree with!

Evaluation

Because the course includes knowledge as well as awareness, the method of evaluation and the criteria for evaluating competency should take both these aspects into account. The learning objectives used in the detailed teaching syllabus should provide a sound basis for the construction of suitable tests for evaluating the course participants' progress. The effectiveness of any evaluation depends upon the accuracy of the description of what is to be measured.

Attachment 4: Additional information on four-day course content by ProSea (The Netherlands)

This attachment describes guidance to the instructor on the coverage of subjects and workshops listed in the four-day course outline. This manual reflects the views of the course developers with respect to methodology and organization as well as what they consider important considering their experience as instructors of this course. The description is based on the Dutch sustainable fishing course programmes for fishing education bodies and for active fishers. It works for fishers in the Netherlands in the context of the Dutch fishing industry.

It is essential to recognize that the fishing sector in every Contracting Party is different and unique in many aspects. The guidance given is intended to give the instructor an operational baseline to develop a course that will meet the local requirements and to use the instructor's own experience and ideas. Setting up sustainable fishing training for fishers in different countries requires that the course should be adjusted to the specific situation for that country or region, and adjusted to education level, language, culture, specifics of the fishing sector and the local environment. This manual is therefore to be used as a starting point and inspiration, and not as a strict blueprint.

Opening lecture - sustainable fishing

The starting point of the course should be a reference to the long history of (local) fishing by showing an old fishing vessel. Comparing this to a picture of a modern vessel shows that fishing is not the same as it used to be. Going through some of the recent changes in fishing emphasizes that being a fisher today is different than 100, even 10 to 20 years ago. The job has changed due to increasing costs, more regulations, farmed fish products on the market and a higher demand for responsible and sustainable fish products. In addition, our seas are used for more than fishing alone, so fishing grounds are under pressure. Also, and partially as a reaction to these developments, the fishing sector itself has experienced large changes in the past 10 to 20 years such as new fishing techniques and more market-focused thinking.

In these modern times, fishers need to operate as entrepreneurs, who can make well-informed choices in their fishing practices and operate in an ever-changing world. To be able to do this, fishers need new knowledge and new skills, different than the knowledge and skills needed in the past.

The concept of sustainable fishing is introduced as a way of long term thinking about solving environmental challenges. Sustainable development is defined as: "Meeting the needs of the present without compromising the ability of future generations to meet their own needs." Sustainability is not just focussing on making as much profit as possible in the short term but taking social aspects and care for the environment into account as well. In business terms, finding an acceptable balance between social, economic and environmental performance, often illustrated as the three P's: People, Planet and Profit. Several examples from other businesses should be given.

Legislation, technical installations, procedures and innovation in fishing techniques all help in the sustainable development of the fishing industry. It should be emphasized that these can only be effective if people, fishers and all others involved, have the right competences and attitude to strive for sustainable fishing and to make the right choices. So, also in the strive for sustainable fishing, competent people are essential. This course is designed to give fishers awareness, knowledge and skills related to the three P's of

sustainable fishing, with the goal to enable fishers to make the right business choices, to minimize pressures and to participate in the sustainable development of the fishing industry.

A time schedule of the course should be presented – special attention should be paid to the varied set up of the course as a mix of lectures and workshops. Instructors should stress that the course is more than listening to information about different aspects of sustainable fishing. Participants are required to be actively involved and to share their knowledge, ideas and opinions (also when these are different than what is presented!).

Workshop TOP 5

This workshop is set up early in the course programme to establish a starting point and assess the current knowledge of the participants about sustainable fishing. It invites them to become actively involved in the course, shows them that their opinions matter and gives a feeling of ownership of the course content. It also enables participants to relate their ideas and opinions to the ideas and opinions of others.

Participants will have prior knowledge, ideas and experiences with sustainable fishing. In this workshop, they are asked to share this knowledge and their opinions about different aspects of sustainable fishing.

The group is divided in subgroups of 4-8 participants and given an assignment. Different types of assignments can be used. One that works very well is asking the groups to make a list of different aspects of sustainable fishing and give their opinion about their respective importance, for example: Make a TOP 5 of the most important aspects of sustainable fishing, (your opinion).

All groups present their results in a plenary session, so all participants are aware of the results of the other groups. The plenary session gives instructors the chance to ask questions when things are not clear and to point out common themes or differences between the groups.

Instructors are encouraged to give participants the chance to voice their opinions and to listen to the opinions of others. At this point in the course, little attention should be given to the correctness of arguments. It is important for the participants to feel that their opinions and ideas are important, so they are more likely to share their opinions, thoughts and feelings during the rest of the course. The instructor should listen closely to the groups and the plenary presentations, because it will give him or her information about the current knowledge and awareness of the participants. This will enable the instructor to emphasize certain information in his/her lectures later.

Marine environment

Starting point of sustainable fishing is basic knowledge and a (personal) connection with the marine environment. The marine environmental lecture consists of 4 parts: the importance of the sea for humans (ecosystem services), basic ecological knowledge of 'how the sea works', an explanation of the differences between open ocean and coastal seas, and, a description of the diversity and difference between marine areas.

- Over 70% of the world's surface is covered with water – the ocean. The biodiversity in the sea is enormous. The ocean also plays a very important role for human life on earth. It provides food and oxygen, regulates our climate, and is economically important, for instance because it provides a means for transport, and over 200 million people work in the fishing industry. The video 'The importance of the Ocean' shows many ecosystem services in a dynamic video of 2 minutes.

- Most people are familiar with bigger sea life like fish and whales, and fishers have first-hand experience with amazing sightings. However, most plants and animals in the sea are small, and they are very important. Microscopic organisms called phytoplankton or algae are the basis of almost all sea-life. These green plants transform carbon dioxide and water into glucose (sugar) by using sunlight. This process is called photosynthesis. It has oxygen as a by-product. The organic matter (sugars, proteins, lipids, etc.) generated by phytoplankton is passed on to other marine organisms in the food chain. In a food chain, primary producers such as phytoplankton are consumed by plant-eating organisms (herbivores), which in turn are consumed by animal-eating organisms (carnivores or predators). All food chains are connected in more complex food webs. After all, most organisms eat more than one type of food and can be eaten by more than one type of predator.

In marine food chains, about 90% of the energy of the ingested food is used for processes like movement, breathing, eating and reproduction. A considerable part of the energy is lost as heat. Only 10% of the energy gained from food is used to grow. When a plant or animal is eaten, it is the organic material from this 10% weight gain that is passed on to the next level in the food chain. This 10 percent rule means that you need a huge number of algae at the base of the food chain to produce one big fish at the top of the food chain.

Food chains are not straight lines: they are circular, because nutrients are recycled. Here, bacteria play an important role. Bacteria break down waste products and dead organisms, releasing nutrients and carbon, which can re-enter the food chain via the primary producers.

- Oceans can roughly be divided into the open ocean and coastal seas. The coastal sea is the shallow (<200 m) sea area above the continental shelf. Beyond that, the open ocean extends. The open ocean is relatively deep, on average 3.7 km. The physical and biological characteristics of the open ocean and coastal seas are very different. The open ocean is a nutrient-poor environment, coastal waters contain many nutrients, thanks to run-off from rivers. Other differences include the penetration of sunlight, the temperature, the salinity, and mixing of water layers.

This has consequences for the living conditions for marine organisms in these areas, and for types of plankton, levels of primary production, and food chain lengths. In the open ocean, only the very small phytoplankton cells can survive the nutrient-poor and stable waters. In nutrient rich coastal areas plankton is large (diameter up to 300 μm) and has more complex shapes. Bigger plankton means more food for fish, shorter food chains and therefore, better fishing!

- After the general information about marine ecology and the difference between open ocean and coastal seas, it is important to apply this knowledge to a variety of different marine areas, including the specific sea that the fishers are working in. Show pictures that emphasize the beauty and biodiversity, elaborate on the importance for humans and show your area as an example of a coastal sea (with a food chain, food web etc). Finally, address that the sea is not used by fishers alone but has lots of activities going on by other (economic) sectors. As a fisher, you need to be aware of the environment that you are working in and of the other activities taking place at sea.

In addition, the course developers have experienced that a personal connection with the marine environment is achieved most successfully when people have a personal experience with the marine environment. And in the case of a fisher, not just with the fish that they want to catch, but the entire ecosystem that the targeted fish is based on and depends on. Therefore, instructors are encouraged to organize an outdoor excursion. This way participants get the chance to experience the diversity and beauty of marine life in a nearby local marine environment, apply the theoretical knowledge about 'how the sea works', and, get a sense of the entire system that is behind the production of fish.

Fishing economics

The profit P is part of sustainable fishing. This course emphasizes that fishers are entrepreneurs that should make informed choices, including those related to sustainable fishing, and information about economic aspects of fishing are an important part of the course.

The part of the course addresses the fishing fleet and fish consumption, basic economic thinking about proceeds and costs, information about the fish supply chain, and, certification.

- Asking questions to the participants, the instructor addresses the history, size and composition of the national (or regional) fishing fleet. It is important to understand the size of the fleet, the fishing methods they use and the economic importance (macro-economy). In addition, when possible, a connection between the catch and (national) fish consumption should be made. Let's put this in perspective: Who eats the fish that we catch? How much fish do people eat? Do we catch enough to supply that fish? How much fish would we need to catch if everyone ate fish twice a week, or once a month, as an example.
- Fishing entrepreneurs need to have a clear understanding of the proceeds and costs of a fishing business and how to influence them. Participants will have some prior knowledge and it is the instructor's job to make an inventory of what they know and fill the gaps, and, to challenge them to come up with ideas how fishers can influence both proceeds and costs.
 - Proceeds: Fishers sell the fish they catch, either at an auction, to wholesale, or directly to customers. The price they get will be influenced by the selling method, but also, for example, by the assortment, quality and certificates.
 - Costs: Running a fishing business requires making costs and the participants probably can come up with a long list of costs. These costs can be divided in technical cost (e.g. ship, nets), fuel cost, crew salaries, auction cost, insurance costs, cost for the ship owner (lone interest, and depreciation) and taxes.
After completing the list of costs for the ship owner, it is important to focus on how they earn money as crew, as fishers. How does the salary system work? And how about taxes?
- After the fishers land the fish, the fish travels (sometimes a long way) to the consumer, the person eating the fish. As a fishing entrepreneur, it is important to understand the different steps the fish takes (e.g. auction, wholesale, processor, exporters, restaurants, retail), what happens to the fish during those different steps, and, how that influences the price of the fish. Why is the fish in the supermarket so expensive, while I as a fisher only get this low price? Ask the students for ideas how they can work with the supply chain in an economical profitable way and give examples where fishers have been successful.

A series of cartoons 'Who is the best fisherman?' emphasizes one of the main aspects of economic thinking. It shows the need for fishers nowadays to be more than just fish-hunters, but fishing entrepreneurs. The series of illustrations shows a tough looking fisher that aims to catch as many fish as possible, and a second skinny looking fisher who also takes quality and cost into account.

Fisheries and fishery management

A sustainable development of the fishing industry means a sustainable management of fish stock. In this interactive part of the course, the instructor works with the participants to provide a basic understanding why fishing management is necessary (this includes information about the impacts of fishing techniques on the environment such as seabed disturbance and overfishing), what fishery management means, who is

responsible for what. The participants work on several assignments to gain understanding about several key aspects of fishery management.

- This programme starts with the principle of the ‘tragedy of the commons’. When more fishers operate in the same sea, it is profitable for every individual fisher to catch as much fish as possible (and make the most profit), but when everyone does that without limits, the sea might suffer, fish gets depleted and catch for all fishers goes down. To avoid this, proper management of fish stock and fisheries is important, not just for the sea, but also for business (in the long run).
- A lecture describes that EU countries share seas and share the common resource of fish in those seas. That is why the EU is responsible for fishery management. The Common Fisheries Policy (CFP) is a set of EU rules for managing European fishing fleets and for conserving fish stocks. It gives European fishing fleets equal access to EU waters and fishing grounds and allows fishers to compete fairly. The CFP aims to ensure that fishing is environmentally, economically and socially sustainable (People, Planet, Profit) and that it provides a source of healthy food for EU citizens. Its goal is to have a dynamic fishing industry and to ensure a fair standard of living for fishing communities. Although it is important to maximize catches, there must be limits to make sure that fishing does not have excessive impact on the marine environment and that fishing practices do not harm the ability of fish populations to reproduce. The current policy sets catch limits that are sustainable and maintain fish stocks in the long term. It also aims stop discarding by gradually instituting the landing obligation. The ‘EU Common Fisheries Policy’ is an animation that describes the CFP.
- Emphasize that the EU, the fisheries manager, is responsible for the policies. Scientists, NGO’s and fishers also play a role in fishery management. Scientists research fish stocks, measure and calculate and give information to the EU. In advisory committees, fishers and environmental NGO’s meet and give advice to the manager about the policies. However, at the end, it is the EU that decides.
- The amount of fish (in kg) will increase when fish grow and reproduce, and will decrease when fish die, by natural causes or because they are caught by a fisher. Both nature and humans influence the fish stock in the sea. However, we cannot change the natural causes (only try to understand them) and therefore, fishery management focusses on the role of humans.
Central themes connected to fishery management are technical measures (like mesh size, selective fishing, fishing effort, fish gear choice and real time closures), fish stock assessment and the landing obligation. Instructors are encouraged to give the participants a series of assignments to help them understand (some of) these important themes. The assignments should be designed with the specific local situation in mind and may vary greatly per country. However, goal of the selection of exercises is to gain a basic understanding of the background of fishery management, and, more understanding of where rules and regulations come from.

Environmental challenges

Environmental challenges connected to and relevant for the fishing industry include oil pollution, marine litter and climate change. It is important to have a basic understanding of the environmental challenge, the connection to the fishing industry, MARPOL regulations and the role the fishers are playing and can play to contribute to solutions for these environmental challenges.

- Oil

Ecological impacts of oil include toxic effects on zooplankton, fouling of the plumage of birds and the fur of mammals, tainting of shellfish and oiling of coastal habitat such as beaches, mangroves and tidal areas.

Economic effects include clean-up cost and damage to fisheries and the tourism industry. The exact impacts from an oil spill depend on several factors, including where an oil spill takes place. Not only accidents with oil tankers are a problem. A small spill or discharge at the wrong place, at the wrong time, can cause a lot of damage.

- Marine Litter

When solid waste ends up in the marine environment, it is described as marine litter. This includes all man-made objects that do not naturally occur in the marine and coastal environment. In many regions, plastics constitute the majority (up to 90 per cent) of the total amount of marine litter. Marine litter includes items that are discarded directly into the sea (thrown or lost), brought to the sea indirectly by rivers, or left by people on beaches, in harbours and on shores. Marine litter is found everywhere in the marine environment, all around the world. However, most of the litter sinks to the sea floor. It is a truly global problem, illustrated by the plastic soup, floating garbage that collects in so-called gyres. Besides on beaches and in the water column, litter is found on the sea floor.

Entanglement and ingestion are the two primary kinds of direct damage to wildlife:

- Entanglement means that an animal becomes encircled or ensnared by litter. This may happen accidentally or because the animal is attracted to litter out of curiosity or when in search of food or shelter. Entanglement can impede natural behaviour in all sorts of ways and can eventually lead to death;
- Ingestion occurs when animals swallow litter items. Generally, animals swallow litter items because they resemble their natural prey. Typical examples of such food mix ups are when turtles eat plastic bags (mistaking them for jellyfish), birds feed plastic to their young, or fish mistake plastic pallets for fish eggs. In addition, shellfish may ingest plastic when filtering plankton out of the water they ingest. Ingestion can lead to malnutrition or starvation. The swallowed litter items can accumulate in the digestive tract and make the animal feel “full”, while the litter has no nutritional value.

The marine environment contains a vast quantity of tiny pieces of plastic smaller than 5 millimetres in diameter. Called microplastics, much of this material is microscopic in size. As small animals at the base of the food chain ingest microplastics, the toxic chemicals in plastic enter the food chain. These chemicals interact with numerous biological processes and may eventually pose risks for humans eating contaminated marine organisms.

Marine litter also causes serious damage to people, property and livelihood and has significant economic repercussions on coastal and fishing communities. Adverse impacts include damage to fishing vessels and gear, safety risks at sea, damage to power stations, contamination of beaches and clean-up costs.

Fishing is one of the contributors to the marine litter problem, for example through improper waste management on board or in harbours, loss of fishing nets and ropes or abrasion of plastic materials. Fishing can also be part of the solution, for example through projects like fishing for litter.

- Climate change

Climate change is a pressing issue on political agendas and the media are full of it. Climate change has been investigated by scientists for decades, of which the last two decades by The Intergovernmental Panel on Climate Change (IPCC). The IPCC defines climate change as: "any change in climate over time, whether due to natural variability or as a result of human activity".

The sun warms the Earth's surface and atmosphere. Some of the sunlight striking the earth is absorbed and converted to infrared radiation (heat), which warms the surface. The surface also emits this infrared radiation back to the atmosphere. Greenhouse gases (GHGs) like carbon dioxide, methane, and nitrous oxide in the atmosphere trap this infrared radiation like the glass walls of a greenhouse. This process warms the atmosphere and is called the "greenhouse effect". Without the natural greenhouse effect, life on Earth as we know it would not be possible. The average world temperature would be -18°C, rather than +15°C which is the current average.

Greenhouse gases are produced by natural processes, such as volcano eruptions, natural forest fires, and decaying plants and trees. Since the beginning of industrialization around 1750, humans have also started producing GHG. Some examples of human activities producing GHG are combustion of fossil fuels (by cars, airplanes, ships, etc.), electricity and heat production, and agriculture. Since the beginning of industrialization, concentrations of GHG in the atmosphere have notably increased. This enhances the natural greenhouse effect. Of all greenhouse gases produced by humans, the amount of CO₂ is the most influential.

During the past century, scientists have also measured that, on average and worldwide, global air and ocean temperatures are rising, snow and ice are melting, and sea levels are rising. According to the IPCC, anthropogenic (human) greenhouse gases have very likely caused most of these changes over the last 50 years. The IPCC-report states that it is very likely that the observed change in world temperatures is not only due to natural processes.

There is scientific consensus about the causes and occurrence of climate change. But the future effects, consequences and developments of climate change are much more difficult to predict and subject to many uncertainties. That's due to the complexity of processes in the Earth's climate system. Nonetheless, some predicted effects include sea level rise, loss of biodiversity, increase of human diseases, damage to coral reefs and unpredictable weather patterns, including increase of storm intensity.

People P

With the changes in the fishing industry in the last 20 years, the interest of stakeholders for fishing and fishers has increased. Nowadays, everyone seems to have an opinion about fishing. People realise that the fishing industry is important in supplying food, but the fishing industry also receives more attention because of an increased emphasis for a healthy marine environment. In addition, consumers are increasingly critical and demand to know where their products come from.

Sustainable development of the fishing industry is more than earning good money in as responsible way (Profit P) and taking care of the environmental (Planet P). A sector like fishing also must be aware of the people part of sustainability (People P). The people P is about fair salaries for workers, a safe working environment and tolerable working hours, but also about the relationship between fishing and society.

It is often said that for economic sectors, acceptance by society is a license to operate, or in case of fishing, a license (privilege) to extract a resource. As some stunning examples in the past (like the Brent Spar) have shown, society can withdraw this license, for example by stopping to buy certain products (like fish) or voting in political parties that are more critical of the industry. This aspect of the People P will be explored during a workshop.

In this workshop, after an introduction of the People P, instructors should ask participants to think about the image of fishing (group assignment 1; what do others think about fishing and fishers) and about the

identity (group assignment 2; what do I think about fishing and fishers). After the results are presented and summarized, participants are invited to share ideas and opinions about the difference between the image of fishing and their identity, between what others think and what they think themselves. Keeping in mind that the image may give insight in how society thinks about fishing and about the acceptance by society, participants should be encouraged to think about the causes of this difference (why do we have this image), the consequences (how can a good image be helpful?), and ways to improve the image or to ensure that the image more closely resembles the identity of fishers and the fishing industry.

Communication

When everyone seems to have an opinion about fishing, and the fishing industry and individual fishers have to deal with more interested stakeholders, good communication is important. When the image of fishers and the fishing industry is different than you think it should be, communication might be essential. For a lot of fishers, communication to people outside the fishing industry is a new skill.

Good communication is difficult and as with most skills, practice makes perfect. In this workshop, the participants will practice basic communication skills, including being aware of non-verbal communication, communication styles and the importance of listening. How do you talk to people that you do not agree with? How do you present a good story? How to ask questions? Why is it important to use understandable language?

Final workshop

At the end of the course, the students will get a final group assignment. Since the course is called 'Fishing with a future', this assignment should be focused on their ideas about the (sustainable) future of the fishing industry. Groups will choose a theme that is important for the future of the fishing industry, for example:

- Sustainable fishing techniques/net design
- Ship of the future
- Cooperation in the fish supply chain
- Fishing and marine litter

Guided by a set of questions, and using the knowledge, awareness and skills they have gained during this course, they will prepare a presentation about their ideas of the future of this theme. Special attention should be paid to how they view their own involvement and responsibilities.

The course is concluded by the presentations of the different groups.