

JERICO QUESTIONNAIRE

*PLEASE COMPILE ONE QUESTIONNAIRE FOR EACH
INFRASTRUCTURE/INSTALLATION*

Task 4.2 Biofouling prevention

Overview of currently used biofouling prevention methods

| <u>Infrastructure/installation</u> | |
|--|--|
| NAME/DESIGNATION (if any) | |
| TYPE OF INFRASTRUCTURE (e.g. buoy, ferrybox, glider, etc.) | |
| OPERATIONAL AREA (e.g. Baltic Sea, Mediterranean Sea, etc.) | |
| GEOGRAPHICAL COORDINATES (if applicable) | |
| DISTANCE FROM THE COAST (km) | |

| <u>Contact Details</u> | |
|----------------------------------|--|
| MANAGING INSTITUTE/ORGANIZATION: | |
| DEPARTMENT (if any): | |
| ADDRESS: | |
| COUNTRY: | |
| TEL: | |
| FAX: | |
| NAME OF CONTACT-PERSON: | |
| E-mail: | |

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Part a: General Information

1) *Is biofouling a problem in your observing activities?*

2) *How much does biofouling influence the way in which you plan your observing activities (as a fraction of the total money and time invested on a percentage scale)?*

Money:

Time:

3) *How much does biofouling influence the way in which you conduct your monitoring activities (as a fraction of the total money and time invested on a percentage scale)?*

Money:

Time:

4) *In the list of anti-biofouling techniques below, please indicate the ones which you currently use.*

Mechanical device (wipers or scrapers; please specify)

Uncontrolled biocide generation system (e.g cupronickel endplate; copper tubing systems; copper shutters; please specify)

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Controlled biocide generation system (e.g. chlorination, electrolysis chlorination; please specify)

Irradiation system (e.g. UV; US; please specify)

Some combination of the above (please specify)

Other (please describe below)

5) *In the list of anti-biofouling techniques below, please indicate the ones which you think are currently the most effective.*

Mechanical device (wipers or scrapers; please specify)

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- Uncontrolled biocide generation system (e.g. cupronickel endplate; copper tubing systems; copper shutters; please specify)

- Controlled biocide generation system (e.g. chlorination, electrolysis chlorination; please specify)

- Irradiation system (e.g. UV; US; please specify)

- Some combination of the above (please specify)

- Other (please describe below)

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6) *In the list of anti-biofouling techniques below, please indicate the ones which you think show the greatest promise for the future.*

- Mechanical device (wipers or scrapers; please specify below)

- Uncontrolled biocide generation system (e.g cupronickel endplate; copper tubing systems; copper shutters; please specify below)

- Controlled biocide generation system (e.g. chlorination, electrolysis chlorination; please specify below)

- Irradiation system (e.g. UV; US; please specify below)

- Some combination of the above (please specify below)

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Other (please describe below)

7) *In your view, which of the following modes of action would be preferable for an anti-biofouling system:*

Active: the system requires a power supply in order to function (i.e. it needs to be energized to work, and possibly could be turned on and off);

Passive: the system does not require a power supply in order to function (i.e. it is always working, and cannot be turned off).

8) *In your view, is there any advantage to using closed-path sensor systems (i.e. systems where sensors are served by a single, closed hydraulic circuit with just one entrance and one exit for a sample stream) over open-path ones, from the perspective of the biofouling (biofilm/slime, hard-fouling, soft-fouling) problem (e.g. extended operational life, easier maintenance, other)?*

(please explain your reasons giving details)

9) *Are you aware of any recurring differences in the extensions/distributions of the various types of biofouling (biofilm/slime, hard-fouling, soft-fouling) between physical, optical and chemical sensors?*

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(if **Yes**, please specify the kinds of sensors, the patterns noted and, if possible, the common/scientific name(s) of the organism(s) or group(s) of organisms involved)

10) Do you have any suggestions for choosing / promoting / developing new anti-biofouling systems for specific sensor(s) or sensor system(s)?

(if **Yes**, please provide a brief description of your idea)

11) In the list of sensors below, please indicate only the ones that you are currently using on your infrastructures/installations

Physical sensors for:

- Temperature
- Conductivity (Salinity)
- Dissolved oxygen
- Water Currents
- Pressure
- Other (please describe)

Optical sensors for:

- Chlorophyll a,
- Turbidity,
- Photosynthetically Active Radiation (PAR),
- Other (please describe)

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Chemical sensors for:

- Phosphates
- Silicates
- Nitrates
- Nitrites
- Ammonia
- Dissolved oxygen
- pH
- Total alkalinity
- Total carbon dioxide
- Dissolved organic carbon
- Total organic carbon
- Other (please describe)

Submitted on:

(Date)

Compiled by:

(Name of respondent)

Please complete the questionnaire using the forms provided in the following pages (Part B) to provide details regarding your biofouling prevention practices for each of the sensors that you have selected in the above list.

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Please compile a separate Part B form for each sensor group you selected in the list of sensor types that was presented in Query 11 in Part A of this questionnaire

Part b: Biofouling prevention practices

1) Sensor description(s): kindly report the parameter/measurand being measured, the instrument manufacturer(s), the instrument model(s), and the operating depth(s).

2) Do you currently apply any anti-biofouling measure(s) for this (these) sensor(s)?

(if **Yes**, please provide the name(s) of the sensor(s) and describe the relative applied anti-biofouling measure(s), giving details of any operational/technical/management difficulties).

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- 3) *Can you provide an estimate of the minimum maintenance-free duty cycle(s) (days or months) for your sensor(s) furnished with an anti-biofouling system?*

(if **Yes**, please provide the name(s) of the sensor(s) and its(their) duty cycle(s) in days or months)

- 4) *Can you provide an estimate of the minimum maintenance-free duty cycle(s) (days or months) you could expect for your sensor(s) if they were to be deployed without any anti-biofouling system?*

(if **Yes**, please provide the name(s) of the sensor(s) and its(their) duty cycle(s) in days or months)

- 5) *Are you aware of any recurring differences in the extensions/distributions of the different types of biofouling (biofilm/slime, hard-fouling, soft-fouling) in relation to the depths at which your sensors are placed?*

(if **Yes**, please specify the depth level(s), the pattern(s) noted and, if possible, the common/scientific name(s) of the organism(s) or group(s) of organisms more present)

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- 6) *Are you aware of any recurring differences in the extensions/distributions of the different types of biofouling (biofilm/slime, hard-fouling, soft-fouling) affecting your sensor(s) or sensor system(s) in relation to the season of the year (spring, summer, autumn, winter)?*

(if **Yes**, please specify the seasons, the pattern(s) noted and, if possible, the common/scientific name(s) of the organism(s) or group(s) of organisms present)

- 7) *In your view, which are the parts of your sensor(s) or sensor system(s) that are most affected by biofouling?*

- 8) *In your view, which type of biofouling (biofilm/slime, hard fouling, soft fouling) constitutes the main problem for the housing/container of your sensor(s) or sensor system(s)? (press Ctrl button for multiple choise)*

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9) *In your view, are some types of organisms more likelier than others to be the principal agents of the kind of biofouling you have indicated as the major problem for the housing/container of your sensor(s) or sensor system(s)?*

(if **Yes**, please specify the common/scientific name(s) of the organism(s) or group(s) of organisms)

10) *In your view, are there any types of organisms that, while not directly involved in the kind of biofouling you have indicated as the major problem for the housing/container of your sensor(s) or sensor system(s), can contribute significantly to the overall deterioration in instrument performances?*

(if **Yes**, please specify the common/scientific name(s) of the organism(s) or group(s) of organisms)

11) *In your view, which type of biofouling (biofilm/slime, hard fouling, soft fouling) constitutes the main problem for the sensing element/window/area of your sensor(s) or sensor system(s)? (press Ctrl button for multiple choice)*

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12) In your view, are some types of organisms more likelier than others to be the principal agents of the kind of biofouling you have indicated as the major problem for sensing element/window/area of your sensor(s) or sensor system(s)?

(if **Yes**, please specify the common/scientific name(s) of the organism(s) or group(s) of organisms)

13) In your view, are there any types of organisms that, while not directly involved in the kind of biofouling you have indicated as the major problem for the sensing element/window/area of your sensor(s) or sensor system(s), can contribute significantly to the overall deterioration in instrument performances?

(if **Yes**, please specify the common/scientific name(s) of the organism(s) or group(s) of organisms)

14) In your view, does biofouling influence the quality of the data furnished by your sensor(s)/sensor system(s) over time during a deployment?

(if **Yes**, please explain, if you can, how you decide when bio-fouling is affecting your data, describing the effects and giving the details of any methods - for e.g. modelling - you are using to correct for these effects)

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15) If you think that biofouling can affect the data furnished by your sensor(s)/sensor system(s) over time during a deployment, are you able to distinguish between effects attributable principally to a deterioration in the condition of the housing(s)/container(s) and those caused by the degradation of the sensing element(s)/window(s)/area(s)?

(if **Yes**, please categorize the effects you mean, describing the method(s) – for e.g. modelling - you use to distinguish between them)

16) Kindly provide an estimate of how much you spend annually for the anti-biofouling system(s) of your instrumentation, considering the following:

| | |
|--|----------|
| Purchase price(s) of the system(s) (if quoted separately): | (€); |
| Implementation of the system(s) (if applicable): | (€); |
| Maintenance & consumables: | (€year); |
| Other (please specify): | (€year); |
| Total: | (€year). |

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Thank you for your collaboration, save the compiled Biofouling Questionnaire (BQ)

**please save file as: [Surname of Respondent]-BQ-1.pdf
(e.g. Brown-BQ-1.pdf)**

If you need to compile a new Part B please press the following button

**please save file as:
[Surname of Respondent]-BQ-[progressive number].pdf
(e.g. Brown-BQ-2.pdf ; etc.)**

Submitted on:

(Date)

Compiled by:

(Name of respondent)