FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

Feed the Future Bangladesh Aquaculture and Nutrition Activity

HANDBOOK ON ENVIRONMENTAL COMPLIANCE

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Feed the Future Bangladesh Aquaculture and Nutrition Activity

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HANDBOOK ON
ENVIRONMENTAL COMPLIANCE

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The purpose of this Handbook is to facilitate sound environmental compliance practices. It was created by translating the Feed the Future Bangladesh Aquaculture and Nutrition Activity's Environmental Mitigation and Monitoring Plan (EMMP), which was developed to ensure that the Activity leaves no or minimal negative impacts on the environment. The EMMP has been approved through a detailed analysis of the anticipated activities to identify potential negative environmental impacts.

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1 Summary of the Environmental Mitigation and Monitoring Plan (EMMP)

Activities	Potential Impacts	Mitigation Measures	Monitoring Measures	Monitoring & Reporting	Parties Responsible
Promoting aquaculture	• Biosafety could be disrupted if invasive alien species are introduced. • Food safety could be disrupted if harmful inputs/chemicals are used. • Aquaculture might be extended to protected areas (PAs) or environmentally sensitive areas.	• Avoid introducing invasive alien fish species. • Avoid importing any fish or aquatic plants from outside of Bangladesh without prior approval as specified in the Handbook. • Follow and comply the approved and rejected inputs. • Conduct training and demonstration trials in a way that would not convert any PAs nor be extended into an environmentally sensitive area.	• Use only approved fish species and chemicals, aqua-medicinal products (AMPs) as well as other substances, as specified in the Handbook. • If imported any aquatic flora or fauna, submit the image of “Import Clearance Certificate/ Phytosanitary Certificate” issued by the appropriate GoB authority to the Environment Specialist (ES), who in turn will preserve the document.	Routine	Subgrantee’s point of contact (POC) will provide the information and reports as and when needed.
Promotion of fish nursery	• Bio-safety might be disrupted if invasive alien species introduced. • Food safety might be disrupted if harmful inputs/chemicals are used and/or appropriate cleaning, disinfection and waste management are not followed	• Messages will be incorporated to avoid introduction of invasive alien fish species; “List of Approved and Rejected Inputs” will be followed and ensured; • Appropriate cleaning, disinfection, and waste management will be followed;	• Only the approved fish species and the chemicals and other substance as specified in the Handbook will be used; • The GAPs and training manuals developed under sub-grants will be reviewed by the ES;	Routine	The subgrantee’s POC will provide the information and reports as and when needed.
Promoting kitchen	• This could have significant impacts on the environment if	• Avoid importing any plant from outside of Bangladesh	• Use only approved vegetables/crops and chemicals, as well as other	Routine	Subgrantee’s POC will provide the

Activities	Potential Impacts	Mitigation Measures	Monitoring Measures	Monitoring & Reporting	Parties Responsible
gardening/ dike cropping	inappropriate inputs (i.e. chemical fertilizers, pesticides) are used, or if it is extended to environmentally sensitive areas.	without prior approval as specified in the Handbook. • Promote good agricultural practices (GAPs) including integrated pest management (IPM). • Follow the list of approved and rejected inputs. • Conduct training and demonstration trials in a way that would not convert any PAs nor be extended into an environmentally sensitive area.	substances, as specified in the Handbook. • If imported any plant, submit the image of "Import Clearance Certificate/ Phytosanitary Certificate" issued by the appropriate GoB authority to the ES, who in turn will preserve the document. • The ES will review GAPs and training manuals developed under subgrants.		information and reports as and when needed.
Promoting verme-composting	• Biosafety could be disrupted if invasive species are introduced.	• Avoid introducing invasive earthworm species.	• Use Australian Red Worm (*Eiscnia fetida*), known locally as Tiger Worm.	Routine	Subgrantee's POC will provide the information and reports as and when needed.
Promotion of algae/microalgae cultivation	• Bio-safety might be disrupted if invasive alien species introduced. • Food safety might be disrupted if used harmful inputs/chemicals.	• Introduction of invasive alien species will be avoided. • "List of Approved and Rejected Inputs" will be followed and ensured. • Day-to-day operational manual will be developed. • Farmers' training manual/module will be developed. • Trainings and demonstration trials will be conducted in a way that would not convert	• Only the approved chemicals and substances as specified in the Handbook (applicable for pond aquaculture and hatchery) will be used. • Day-to-day operational manual, GAPs, and training manual/module developed under the sub-grant will be forwarded to the Environment Specialist (ES) for his review and inclusion of environmental issues.	Routine	The subgrantee's point of contact (POC) will provide the information and reports as and when needed.

Activities	Potential Impacts	Mitigation Measures	Monitoring Measures	Monitoring & Reporting	Parties Responsible
		any PA nor will be extended in an environmentally sensitive area. • Avoid importing algae/microalgae from outside of Bangladesh without prior approval as specified in the Handbook.	• If imported any aquatic flora or fauna, the images of "Import Clearance Certificate/Phytosanitary Certificate" issued by the appropriate GoB authority will be submitted to the ES, who in turn will preserve the document.		
Promoting quality fish seed production	• Biosafety could be disrupted if invasive alien species are introduced. • Fish seed adulteration could take place. • Food safety might be disrupted if harmful inputs/chemicals are used and/or appropriate cleaning, disinfection and waste management are not followed.	• Incorporate messages to avoid introducing invasive alien fish species. • Promote broodstock purity, and avoid inbreeding or other causes of seed adulteration. • Follow the list of approved and rejected inputs. • Follow appropriate cleaning, disinfection and waste management. • Get/update license issued by DoF, as specified in Fish Hatchery Rules, 2011	• Use only approved fish species and chemicals, AMPs as well as other substances, as specified in the Handbook. • The ES will review GAPs and training manuals developed under subgrants. • Subgrantee hatcheries will submit the image of updated license issues by DoF to the ES, who in turn will preserve the document.	Routine	Subgrantee's POC will provide the information and reports as and when needed.
Production and promotion of quality fish feed	• Fish feed adulteration may take place. • Fish health and food safety could be disrupted if harmful inputs/chemicals are used and/or appropriate cleaning, disinfection and waste	• "List of Approved and Rejected additives, binders, and other chemical substances" will be followed and ensured as specified in the Handbook; • The subgrantee will develop a guideline for day-to-day feed mill operation including	• Only the approved additives, chemicals and other substance as specified in the Handbook will be used, and that should be recorded in respective log-sheet(s); • The guideline for day-to-day feed mill operation will be provided to the ES for his	Routine	The subgrantee's POC will provide the information (i.e. image of the filled log-sheets) and

Activities	Potential Impacts	Mitigation Measures	Monitoring Measures	Monitoring & Reporting	Parties Responsible
	management are not followed.	ingredient and feed storage, waste and personal hygiene management, will follow the same; • The subgrantee will develop a guideline for feed storage and waste management at dealers' end, and train them; • Get/update license issued by DoF, as specified in Fish Feed Rules, 2011	review; The day-to-day operation is to be recorded in respective log-sheets; • The guideline for feed storage and waste management at dealers' end is to be provided to the ES for his review; • The Subgrantee will submit the image of updated license issues by DoF to the ES, who in turn will preserve the document.		reports as and when needed.
Promoting equipment, machineries, test kits, etc.	• This will have no significant adverse effects on the environment if equipment and materials are procured, installed and disposed of in an environmentally safe manner.	• Procure equipment and materials from certified retailers, operate them in an environmentally safe manner and dispose of them (at the end of their useful life) to reuse and/or recycle as appropriate. • Equipment and materials must conform to Government of Bangladesh (GOB) and United States Government (USG) legislations.	• The document of purchasing from certified retailers will be kept by the sub-grantee. • The ES will review guidelines for installing, operating, and decommissioning the equipment and materials, as well as training manuals, developed under subgrants.	Routine	Subgrantee's POC will provide the information and reports as and when needed.
Repairing, maintaining, extending or expanding facilities	• Sanitation risk from construction/demolition could include dust and debris. • Demolition waste, such as lead paint and	• Maximize the use of renewable, naturally occurring and locally available construction materials.	• Follow the Standard and Specific Conditions as specified in the Handbook. • Conduct visual site inspection to ensure compliance of the conditions.	Routine	Subgrantee's POC will provide the information and reports as and when needed.

Activities	Potential Impacts	Mitigation Measures	Monitoring Measures	Monitoring & Reporting	Parties Responsible
	other toxic materials, could contaminate soil, groundwater, waterways. • Runoff from leaking fuel or lubricants from construction equipment could contaminate waterways/sources and/or soil. • Construction waste and rubble could create safety hazards and/or damage aesthetics.	• Avoid using lead-containing paints. • Maintain safeguards to contain toxins and dispose of them properly. • Install sediment and dust control measures. • Remove all solid waste and rubble and dispose of it in a proper location.			
Promoting aquaculture medicinal products (AMPs), chemicals, pesticides, fertilizers, etc.	• Fish health, food safety, and ecosystem might be disrupted if harmful inputs/ chemicals are used.	• The Activity has developed a list of approved and rejected inputs by consulting the regulations of both the USG and GOB, and will continue to update the list whenever any changes take place in these regulations. • Follow the list to ensure strict compliance. • Subgrantees who would promote such products will register/update registration of the products with respective GoB organizations	• Use only approved inputs as specified in the Handbook. • Subgrantees who would promote AMP, chemicals, pesticides, fertilizers, etc. will provide information about the products, and the scan copies of their registration documents, as specified in the Handbook, to the ES, who in turn will preserve the document.	Routine	Subgrantee's POC will provide the information and reports as and when needed.

Activities	Potential Impacts	Mitigation Measures	Monitoring Measures	Monitoring & Reporting	Parties Responsible
Postharvest/ food-fish handling	• Food safety might be disrupted if physical, chemical and microbial contamination take place.	• Ensure all cages/boxes, utensils and the surrounding areas are non-toxic and in sound condition to minimize the buildup of fish slime, blood, scales and guts. • Make sure cages, boxes and utensils are smooth and durable to minimize fish damage. • Clean/disinfect cages, boxes, utensils and the surface of floors and walls. • Ensure an adequate supply of quality potable water, ice and/or steam. • Maintain waste management and personal hygiene. • Get/update license issued by DoF, as specified in Fish and Fish Products (Inspection and Qualitiy Control) Rules, 1997	• The ES will review guidelines for maintaining food safety for fish and fish products to comply with HACCP, as well as training manuals developed by the subgrantees. • Subgrantee will submit the image of updated license issues by DoF to the ES, who in turn will preserve the document.	Routine	Subgrantee's POC will provide the information and reports as and when needed.
Processing fish and fish products, curing (i.e. drying) and packaging	• Food safety could be disrupted if physical, chemical and microbial contamination, and/or use of harmful additives take place.	• All raw materials must go through quality inspection. • Avoid non-approved additives, preservatives and chemicals. • Ensure an adequate supply of quality potable water, ice and/or steam.	• The ES will review guidelines for maintaining the food safety for fish and fish products to comply with HACCP and DAP, as well as training manuals developed by the subgrantees. • Subgrantee will submit the image of updated license issues by DoF to the ES,	Routine	Subgrantee's POC will provide the information and reports as and when needed.

Activities	Potential Impacts	Mitigation Measures	Monitoring Measures	Monitoring & Reporting	Parties Responsible
		• Use a vacuum/modified atmosphere packaging (MAP) process for packaging of dried/cooked/semi-cooked products. • For chilled/frozen products, take required steps (i.e. glazing) to maintain cool chain. • Ensure a quality check (including microbial load) of the end products. • Maintain waste management and personal hygiene. • Provide training to own workers. • Get/update license issued by DoF, as specified in Fish and Fish Products (Inspection and Qualitiy Control) Rules, 1997	who in turn will preserve the document.		

2 Summary of Climate Risk Management (CRM) Plan

Activities	Climate Risks	Climate Risk Rating	Climate Risk Management/Mitigation Measures	Monitoring & Reporting Frequency	Parties Responsible
Promoting aquaculture	***Salinity***: Increased salinity from erratic rainfall, a rise in sea level, and storm surges could hamper aquaculture. ***Parasites and diseases:*** Increased prevalence of parasites and diseases that affect aquaculture due to erratic climatic conditions may affect distribution and abundance of disease vectors. ***Parasites and diseases:*** Increased prevalence of parasites and diseases that affect aquaculture due to erratic climatic conditions may affect distribution and abundance of disease vectors.	Moderate	• Select appropriate fish species that are more saline tolerant. • Improve fish health monitoring and pond water quality management. • Strengthen disease surveillance facilities.	Routine	Subgrantee's POC will provide the information and reports as and when needed.
Promoting kitchen gardening/dike cropping	***Precipitation***: Shifts in the distribution and change in the pattern of precipitation could stunt ripening of kernels and reduce yield. ***Salinity***: Increased salinity from erratic rainfall, a rise in sea level, and storm surges may reduce germination rate, affect plant physiology and growth, nutrient deficiency and reduce yield significantly. It could also decrease reproductive growth and may potentially affect the metabolism of soil organisms, leading to severely reduced soil fertility. ***Parasites and diseases:*** Increased prevalence of parasites and diseases that affect aquaculture due to erratic climatic conditions may affect distribution and abundance of disease vectors.	Moderate	• Disseminate information and recommendations about shifting planting dates or even switching crops. • Develop and promote varieties tolerant to heat-stress, salinity and draught. • Broaden genetic base and enhance genetic variability. • Promote soil fertility conservation practices. • Use sustainable intensification to mitigate the effects of climatic and salinity stress and loss of soil fertility from excessive chemical inputs.	Routine	Subgrantee's POC will provide the information and reports as and when needed.

Activities	Climate Risks	Climate Risk Rating	Climate Risk Management/Mitigation Measures	Monitoring & Reporting Frequency	Parties Responsible
Promotion of algae/ microalgae cultivation	***Temperature***: Erratic pattern of temperature affect quality algae/microalgae production. ***Parasites and diseases:*** Increased prevalence of parasites and diseases that affect algae/microalgae due to erratic climatic conditions may affect distribution and abundance of disease vectors.	Moderate	• The topics to cope with erratic pattern of temperature will be discussed in the training sessions; Promote water-recirculation systems to increase the efficiency of the available water; the topics on water quality management, improved cleaning, disinfecting and disease surveillance processes" will be discussed in the training sessions;	Routine	The subgrantee's POC will provide the information and reports as and when needed.
Promoting quality fish seed production	***Precipitation***: Shifts in the distribution and changes in the pattern of precipitation could affect quality freshwater availability for broodstock rearing and hatching. ***Salinity***: Increased salinity from storm surges and a rise in sea level may hamper broodstock maturity and hatching rate. ***Parasites and diseases:*** Increased prevalence of parasites and diseases that affect broodstock and spawn due to erratic climatic conditions could affect distribution and abundance of disease vectors.	High	• In training sessions, discuss topics on pond re-excavating, dike repairing, and installing tube-wells/pumps to overcome freshwater scarcity. • Promote water recirculation systems to increase the efficiency of available water. • In training sessions, discuss topics on broodstock health monitoring, pond water quality management, improved cleaning, disinfecting and disease surveillance processes for hatchery operation.	Routine	Subgrantee's POC will provide the information and reports as and when needed.

3 Standard environmental conditions for construction

Below are the standard environmental conditions. Follow them "as practicable and appropriate" for all types of interventions:

1) Implement activities in a way that will not convert any PAs nor extend aquaculture and agriculture into an environmentally sensitive area.
2) Employ strategies to protect trees, watercourses, other plant or animal species or habitats and important historical and archaeological features to ensure the least possible impact on the local area.
3) Develop specific procedures for storing topsoil and for phased closure, reshaping and restoration of the pit when extraction has been completed.
4) Establish and adhere to timetables for respective interventions to minimize disruption to the normal activities of the area.
5) Avoid inappropriate machinery and equipment maintenance that could contaminate the sites with grease, oil or fuel. Place solvents, lubricants, oils and other semi-hazardous and hazardous liquids over a lined area with appropriate secondary containment to contain spillage. Test the integrity of bulk storage tanks and drums, and secure valves on oil and fuel supplies. Build appropriate containment structures around bulk storage tanks and materials stores to prevent spillage entering watercourses.
6) Build collection channels leading to oil and/or silt traps, particularly around areas used for washing or fueling machines and vehicles. Avoid polluting waterways with stockpiled materials, and cover stockpiled materials as practicable. Prevent runoff of potentially contaminated water into burrow pits. Reduce the spread of ground contaminants, and minimize the disturbance to the area.
7) Handle, store, use and process branded materials in accordance with manufacturer's instructions and recommendations. Remove waste materials from the site and dispose of them in appropriate, designated local disposal areas. Minimize the burning of waste materials.
8) Avoid banned chemicals (e.g. paint, primers, varnishes, stains, sealant and glazing formulations that contain lead). Minimize the use of solvent-based paints, or replace them with water-based materials where possible. Avoid using products with asbestos, particularly in cement, paper, piping, roofing material, and board, sealant and glazing formulations, as well as any other materials.
9) If a regular water testing program is not in place, do not use water pipes (i.e. galvanized iron-zinc coated) containing materials that cause corrosion and make the water acidic (caused by the presence of lead and cadmium). In general, use chlorinate-polyvinyl-chloride (cPVC) pipes.
10) Build tanks or other separators for silt-laden material prior to allowing significant outflow into watercourses. Seal or remove abandoned drains to minimize water contamination.
11) Introduce measures to control and minimize the volume of waste onsite. Segregate waste that can be salvaged, reused or recycled for other purposes or community use. Recycle wastewater to the extent practicable.
12) Bury waste if it cannot be recycled or removed from the site. Ensure it is downhill from drinking water sources, such as wells. Avoid areas of high water tables. Avoid areas where underlying geology makes contamination of groundwater likely, and fill them in clay/plastic containers and arrange the containers decently into the pits before burry them, if necessary.
13) If soil agitation or any other form of construction takes place, renovate the landscape in a way that is appropriate to local conditions as much as is practical. Backfill and/or restore burrow areas and quarries before abandonment, unless there are planned

alternative uses for those sites. Recover and replant topsoil and plants as practicable. Discuss with local communities the option of retaining quarry pits as water collection ponds to cultivate fish, water cattle or irrigate crops, or for similar uses.

14) Develop and implement appropriate human health and worker safety measures. Provide workers with appropriate safety equipment. Take safety precautions to protect workers and others from injury. Provide appropriate latrines for sanitation, and ensure safe disposal of gray water from, or places for, bathing and washing. With the workforce and the surrounding community, highlight issues of disease transmission, and prohibit the use of untreated water for human consumption, bathing, and clothes washing. Enforce national child labor laws strictly.

4 Specific environmental conditions for construction

4.1 Repairs and maintenance

These include building repairs, such as painting, replacing fixtures, upgrading electricity and plumbing, as well as routine maintenance.

Specific environmental considerations: Repair and maintenance work should reduce potential negative impacts by means of proper disposal and recycling of any discarded materials from buildings. It should also reduce any temporary disruptions that are under repair. Special care needs to be taken to ensure discarded materials do not contain toxic chemicals.

4.2 Small building construction

These are buildings that do not require foundations but might have a structure that could include independent reinforced concrete pillars embedded in the ground without a foundation. They include sheds, structures to support solar panels, etc.

Specific environmental considerations: Buildings should be sited to reduce potential negative impacts in both low-lying and hilly areas. Construction activities must be done in ways that reduce potential negative impacts during this phase. Fill and excavation processes must ensure minimal environmental impacts before and after construction.

a. All Standard Environmental Conditions apply.
b. Land surfaces vary throughout the country, so the nature of the land will dictate specific precautions. Fill low-lying areas, where short-term annual inundation of water might occur, to ensure buildings are above 25-year flood levels. Make sure cuts and fills in hilly regions, where heavy monsoon rains are common, are well vegetated after construction to avoid soil erosion. In hilly regions, site on flat, not sloped, land whenever possible.
c. Follow the Standard Environmental Conditions for leveling, smoothing and shaping the surface for building construction.
d. In all cases, for any leveling use excavated earth or sand transported in bags by hand from existing local excavation sites. If new sites are needed, choose existing burrow pits instead of creating new burrow pits. Follow Standard Environmental Conditions regarding the rehabilitation of burrow pit areas. Do not use organic or decomposed material for filling to avoid subsistence and/or pollution. Use recycle fill materials where possible.

4.3 Reinforced concrete building construction

These are buildings that require foundations, reinforced concrete and multiple floors in height. They include buildings that require foundations and reinforced concrete support.

Specific environmental considerations: Buildings should be sited to reduce potential negative impacts in both low-lying and hilly areas. Construction activities must be done in ways that reduce potential negative impacts during this phase. Fill and excavation processes must ensure minimal environmental impacts before and after construction.

a. All Standard Environmental Conditions apply.
b. Locate buildings where there is minimal history and risk from landslides, heavy flooding or other natural disasters for which thoughtful placement can effectively reduce risk.
c. Follow the Standard Environmental Conditions for foundations and for leveling, smoothing and shaping the surface for building construction. Land surfaces vary throughout the country, so the nature of the land will dictate specific precautions. Fill low-lying areas, where short-term annual inundation of water might occur, to ensure buildings are above 25-year historical flood levels. Make sure cuts and fills in hilly regions, where heavy monsoon rains are common, are well vegetated after construction to avoid soil erosion. In hilly regions, site on flat, instead of sloped, land whenever possible.
d. In all cases, for any leveling use excavated earth or sand transported in bags by hand from existing local excavation sites. If new sites are needed, use existing burrow pits over creating new burrow ones. Follow Standard Environmental Conditions regarding the rehabilitation of burrow pit areas. Do not use organic or decomposed material for filling to avoid subsistence and/or pollution. Use recycled materials wherever possible.
e. When choosing construction materials, consider the product's effect on the environment and the health of the community. Conduct careful research on composition, effects and usage to select materials that reduce environmental impacts. This process will help facilitate the identification and proper use of construction materials that satisfy industry regulations and the construction standards of the GOB and USG, as specified in the Standard Environmental Conditions.
f. Incorporate the 3Rs (reduce, reuse and recycle) into construction waste management to create a closed-loop manufacturing and purchasing cycle. This significantly limits the need to extract raw materials, reduces pollution and lessens the life-cycle costs of buildings and building materials. Follow guidelines to promote the 3Rs.
g. Handle hazardous materials, such as paints, varnishes and thinning agents, according to the safe practices regulations specified in the Material Safety Data Sheets (MSDSs). Dispose of waste materials in an environmentally safe manner consistent with industry standards and the regulations of the GOB and USG.
h. Ensure that workers remove all unused paint, varnish and paint-thinners so that they can be used in other sites. Contractors must take away all non-hazardous leftover solid materials, such as bricks, sand and cement, to reuse in other sites. They also must collect all recyclable leftover materials (i.e. metal/plumbing short-pieces) from the site and take them to local recycling businesses. Contractors must ensure that all biodegradable materials are delivered to or taken by local people who will use them to make compost. Manage any waste that cannot be recycled, as per the Standard Environmental Conditions.
i. Make sure materials arrive onsite as needed during the construction process. This allows less material to be wasted from problems caused by weathering, improper storage or other forms of onsite damage. Store materials on level surfaces, elevated above the ground, to protect them from exposure to the elements.

j. Strictly follow guidelines for any latrine and water construction associated with building structure. Provide an adequate supply of non-contaminated water and flushing facilities for all toilets designed to use water.

4.4 Water storage

This includes concrete cisterns and overhead water tanks.

Specific environmental considerations: Environmental issues associated with water storage structures are concerned with water quality and potential sources of contamination. This includes the purity of the water that is placed in the structures, potential for water contamination in the structure itself and potential for contamination at the point of exit.

a. All Standard Environmental Conditions apply.
b. Test water that is sourced from tube-wells and pumped into tanks for human consumption using the local Department of Public Health Engineering (DPHE) for contamination. The water must pass US minimum purity standards for both biological and chemical (e.g. salinity and arsenic) contamination before being used. Clean tanks if natural sediments are have accumulated in them.
c. To ensure that potable water is not contaminated before reaching the use point/outlet water that is used, decontaminate tanks before first filling and empty cleaning waste through the piping systems to remove all possible biological contaminants. In case of cisterns, keep lids closed for storage areas at all times, except when cleaning cisterns to ensure no contamination enters. Clean cisterns once every 2–3 months.
d. At the use point, construct a concrete area (minimum 1 m x 1 m) with drainage through a 4-inch PVC pipe. This is needed to empty waste water at least 20 feet from use point into a soak pit (1 m x 1 m x 1 m) filled with course brick chips.

4.5 Pond dikes

While having an environmental impact, these structures are built with the intention of improving ecosystem functioning.

Specific environmental considerations: Pond excavation (either new or for maintenance) is done for the specific purpose of creating improved habitats for fishstocks. The environmental issues involved in this relate to reducing fish mortality during the excavation period and for disposing/displacing soil that is removed during excavation.

a. All Standard Environmental Conditions apply.
b. Develop a remediation strategy that manages soil and other substrates removed or displaced during the excavation process. To the extent possible, use such materials for one or a combination of the following: (1) constructing protective embankments around the water bodies created, (2) distributing to farmers interested in adding soil to farming areas including homestead areas, and/or (3) repairing local embankments, roads or other such structures in need of fill material.

4.6 Water tube-wells

These are installed for water use.

Specific environmental considerations: Water quality is the primary environmental consideration associated with tube-wells. Biological contamination (particularly fecal matter) can occur when the aquifer is contaminated by being too close to a contamination source, such as a latrine, or when the well is not adequately sealed during installation. Chemical contamination, mainly from arsenic, is prevalent in Bangladesh, and water must be tested at the upazilla-level DPHE or other certified testing facility to ensure chemical contamination is below 0.01 ppt. Assessing the risk of water point contamination from latrines is based on gaining an understanding of the amount of time it would take the water, and the pathogens it contains, to travel from the pit to the water point. The longer it takes, the greater the reduction in the number of pathogens through natural die-off. The overall aim in either siting a latrine or water point is to ensure that the pathogen die-off is sufficient to reduce the risk to a level where it is not a public health concern.

Note: Groundwater contamination is a matter of degree. Rather than basing all decisions on absolute water quality targets or guidelines, it may be more helpful to strive for the best practicable water quality, which may be achieved with economic, financial, technical and social constraints.

a. All Standard Environmental Conditions apply.
b. To avoid contamination of tube-wells, build all well infrastructure above the 25-year flood event elevation based on DPHE data and local consultations. Develop a map that shows tube-well infrastructure and location of existing latrine facilities.
c. In Bangladesh, a tube-well that is deeper than 75 meters and penetrates an impermeable layer is called a deep tube-well (as per the DPHE). However, a deep hand tube-well (HTW) operates on exactly the same principles as a shallow HTW and has similar components. The only difference between these two tube-wells is the depth and the water source.
d. HTW installation must successfully meet the following parameters to be accepted as a sustainable and reliable source of safe drinking water: (i) adequate quantity and quality of water during the entire year, (ii) mechanical parts that are all in working order, (iii) a clean, well-sealed platform that provides a safe and efficient source of water, particularly for women, (iv) an effective waste water disposal pit or drainage system that ensures a clean tube-well environment, which also minimizes contamination, (v) and a sanitary area surrounding the tube-well area that minimizes the potential for contamination and reduces the potential for mosquitoes or other potential pests or diseases.
e. Contract qualified local drilling teams (recognized by the DPHE) to complete drilling using a water jet system.
f. The wells must be straight and vertical to ensure the hand pump mechanism can be properly installed.
g. The project engineer is in charge of deciding the specified depth and the most suitable strata for installing the screen. If no suitable layer is found within the specified depth, the engineer can decide to drill farther. However, if a good water bearing strata is encountered above the specified or actual drilled depth, the engineer in charge may also decide to install the screen there.
h. Drill the borehole for deep tube-wells to the required depth with a 150-mm diameter for the first 0–80 m. For the remaining depth, the borehole width must not be less than 100 mm. Use a 38-mm diameter (minimum) cPVC sand trap, a screen and blind pipes for deep

tube-wells. The uppermost 1.5 m of the pipes must be a MS/SS pipe fixed to the cPVC pipes with a socket adaptor.

i. Tube-well components include the following: (i) a 3-m long, 38-mm diameter cPVC pipe with the bottom end capped forming a sand trap, (ii) a minimum 4-m section of 38-mm diameter (minimum) cPVC well screens, (iii) cPVC pipes of 38-mm diameter (minimum) with threaded male/female joints joined using solvent cement, (iv) a 1.5-m long 38-mm diameter (minimum) MS/SS top pipe and (v) a constructed concrete platform. The diameter of the top piece of pipe should be 38 mm (minimum) and made of mild steel or stainless steel. All pipes should be new and have no defects (e.g. holes, rust or pitts).
j. Fill the gap between the tube-well pipe and borehole with approved quality coarse sand from the bottom of the borehole to 6 m above the top portion of the filter. Backfill the next section of the borehole with bentonite slurry up through at least one impermeable layer, and fill the remainder of the borehole with coarse sand.
k. To mix the bentonite, fill a 5-gallon bucket with 3 gallons of water, and mix in the bentonite slowly using a drill with a concrete mixing bit. Add the water first to make the process much easier. Add the bentonite until the mixture thickens but is still easy to pour. After the mixture is prepared, add it into the borehole. To seal, remove the drill head, pour the bentonite mixture down the drill pipe, replace the drill head and turn the water turn back on. Twist the drill pipe back and forth and work it up and down in the usual manner to ensure a good seal is made.
l. Prior to installation, check all of the well fixtures for leaks, cracks, damage, uneven bell mouths or manufacturing defects. Before joining the pipes with solvent cement, clean the inside of the female end and outside of the male end thoroughly with acetone. Next, apply a thin layer of solvent cement to the male (outside) and female (inside) ends, and then clean and dry the exposed surface. Do not use heat when connecting the pipes.
m. Locate tube-wells at a distance that avoids contamination and, where possible, position them downhill from potential sources of contamination. The distance to the nearest point of potential contamination must be site- and aquifer-specific. The risk of contaminating a surface or groundwater source by a latrine depends on the distance to the source, the direction and velocity of the flow of water in the soil (hydraulic hill), and the soil/rock permeability. For most soil types, 30 m is considered the minimum separation. This is the best practice for sites with sand-like filtering capabilities, such as in Bangladesh. High extraction rates (e.g. from a tube-well supplying a large community) will increase the hydraulic gradient in the area around the water point, which will reduce the time taken to reach the water point and therefore increase the risk of contamination. Increase horizontal distances between potential sources of contamination and the tube-well where this is deemed to be a potential issue.
n. To prevent tube-wells from being contaminated by water entering the well pipe apparatus, locate them in areas with documented low probability of being submerged, using a 25-year flood event elevation based on local DPHE records and local discussions. In areas where moderate flooding is likely, raise platforms to a level that ensures water will not enter the pump apparatus.
o. To prevent contamination from surface water entering the borehole, install the HTW and fill the borehole, using sand that is sourced from an area free of contamination and has the right particles size, from the bottom of the borehole up to a point 6 m above the top portion of the filter. From the point 6 m above the borehole where the sand stops, fill the area with a bentonite slurry that continues up the borehole until it passes through one or more non-permeable layers, as per the recommendation of the engineer. Fill the remaining portion of the borehole, if any, with coarse sand.

p. To prevent contamination into the well, check all well fixtures for leaks, cracks, uneven bell mouth and other manufacturing defects prior to installation. Before joining with solvent cement, properly clean the inside of the female end and outside of the male end with acetone. Apply solvent cement in a thin layer to male (outside) and female (inside) ends. The surface must be clean and dry. Test the water quality of the well, before completing the platform and pump, in the nearest DPHE laboratory. The quality of water should conform to US drinking water quality standards for biological contaminants, as well as arsenic and iron levels, and receive approval from the DPHE based on those standards. If DPHE testing facilities are in doubt, verify testing with an independent laboratory. After water quality has been tested and approved, construct the platform. In the event it is not approved, take the well head off and then cap the well to prevent use. Construct the platform only if the well has been approved.

q. For platform construction, remove the topsoil and ram the earth under the entire platform area by hand to provide a stable foundation. Platform size must conform to the minimum size as stipulated by the DPHE. Using sand, brick chips and/or bricks, raise the site above the 25-year flood event elevation level, which is a sufficient height for effective platform drainage. Contractors must ensure that the rebar is welded to the top of the MS or SS pipe and that the rebar is fully embedded in the concrete bed of platform. Construct the platform with portland cement, coarse sand and 19-mm downgraded first-class brick chips in proportions of 1:2:4. Lastly, finish the platform with a smooth cement coating, and cure the platform for a minimum of 7 days. Keep the well capped during the curing, and refit the pump head to the well after the curing is over. Install a DPHE-approved Cast Iron Hand Pump # 6 designed for tube-wells of 38-mm (1.5 inch) diameter. Sufficiently drain the surrounding area, especially where water might accumulate, to avoid pests (especially mosquitoes) and plant the area with vegetation to reduce stagnant water.

r. The community is responsible for maintaining the tube-well, which includes the following: (i) keeping the platform clean and hygienic year-round, (ii) ensuring the drainage from the platform is efficient and does not result in environmental problems, especially contamination of the tube-well, (iii) make sure that no sanitation facilities (latrines) are installed within a 30-m radius of the tube-well and that adjacent latrine installations are built to reduce the potential for contamination, and (iv) keep a tool kit to be used for minor repairs.

s. In the event that a well tests positive for bacterial contamination, conduct a shock treatment using chlorine bleach. In general, for clear well water, use 3 cups of bleach per 100 feet of depth of the well. Well water containing hydrogen sulfide (rotten egg odor), iron (brown water) or manganese (black water) will require additional bleach since these contaminants use chlorine up through a chemical reaction. Remove the pump. Dilute chlorine bleach by about 50% and pour the bleach into the well casing by having it wash down the inside. Mix it by using a plastic bucket with clean water from an uncontaminated well and a plastic hose inserted into the casing. Pour multiple buckets into the hose inserted into the casing for about half an hour. After half an hour, smell the water coming out of the casing. If it does not smell of chlorine, continue pouring more water into the well and smell it every so often until the chlorine odor is present. If necessary, add more bleach until a chlorine odor is detected. This may be necessary due to hydrogen sulfide, iron or manganese in the well water. Reinstall the tube-well pump onto the casing, and let the system sit at least 8 hours or overnight. After disinfection, flush out the highly chlorinated water so that the water can be used for domestic purposes. Pump water from the well until only a slight chlorine odor can be detected.

5 List of approved fish species for aquaculture and reproduction

1) Rui
2) Catla
3) Mrigal
4) Kalibaus
5) Silver carp
6) Grass carp
7) Mirror carp
8) Bighead
9) Black carp
10) Mohashol
11) Common carp
12) Golda
13) Bagda
14) Shing
15) Magur
16) Koi
17) Pabda
18) Golsha
19) Ayre/Air
20) Pangas
21) Shol
22) Chital
23) Tilapia
24) Sarputi
19) Rajputi/Thai Sharputi
20) Bhetki
21) Foli
22) Bata
23) Meni/Veda
24) Bhagna
25) Parshe
26) Kuchia
27) Mola and any other SIS
28) Kakra/crab (if from hatcheries)
29) Other (if any, specify names)

6 List of approved vegetables and crops for cultivation

a) Leafy vegetables:	Red amaranth, stem amaranth, spinach, kangkong/kalmi shak, bati shak
b) Vegetables:	Chili, tomato, cabbage, cauliflower, knolkhol/kohlrabi, carrot, radish, brinjal/eggplant, capsicum, okra, taro, green/country bean, yard long bean, pointed gourd, bitter gourd, sweet gourd, bottle gourd, snake gourd, pumpkin, cucumber
c) Grains:	Rice, maize, wheat
d) Oil seeds:	Mustard, sunflower
e) Pulses:	Mungbean, lentils,
f) Other field crops:	Jute, onion, potato, sweet potato/orange sweet potato, groundnut,
g) Fruits:	Coconut, lemon, wood apple, papaya, strawberry, banana, sapota/sapotilla, mango, watermelon,

7 Importing any live fish, plants, algae, or microalgae

a) According to the Fish Quarantine Act, 2018, no one can import neither fish, any aquatic animals, nor any beneficial micro-organisms without prior approval of Department of Fisheries (DoF). In order to strict compliance of the Act, any one wants to import such organisms, they MUST have to submit the "Import Clearance Letter" issued by DoF to the ES before initiating so.

b) According to the Plant Quarantine Act, 2011, no one can import neither any types of plants, seeds, germplasm, nor any beneficial micro-organisms without prior approval of National Plant Quarantine Authority. In order to strict compliance of the Act, any one wants to import such organisms, they MUST have to submit the "Phytosanitary Certificate" issued by National Plant Quarantine Authority to the ES before initiating so.

8 Promoting aquaculture inputs

The subgrantees who would promote any type of AMPs, chemicals, pesticides, fertilizers, etc. will submit about the information of the products as specified in the following table:

#	**Image** <*insert image of product*>	**Composition/ Active Ingredients** <*name them with quantity/ratio/ %*>	**Advantage/ Indication** <*describe the usage of it*>	**Doses & Administration** <*describe when, how, & at what quantity to apply*>	**Cautions** <*describe what precautions are to be taken*>	**Storage** <*describe where and how it should be stored*>
1.						
2.						

In addition to the aforesaid information, the subgrantees will provide the scan copies of the registration document of the products with respective GoB organizations.

9 List of chemical and other substances for dike cropping

9.1 Approved:

a)	**Urea**, a nitrogen-release fertilizer, may be used in agriculture.
b)	**Single/triple super phosphate (S/TSP)**, a phosphorus-release fertilizer, can be used in agriculture.
c)	**Muriate of potash (MP)**, a potassium-release fertilizer, is approved by USAID for agriculture uses.

9.2 Rejected:

a)	As Bangladesh has ratified the Stockholm Convention, the following **POPs** (persistent organic pollutants) cannot be used: aldrin, chlordane, DDT, dioxins, endrin, heptachlor, hexachlorobenzene (HCB), mirex, toxaphene.
b)	**Sumithion** contains fenitrothion as an active ingredient (AI). Although it is approved in Bangladesh for agricultural use, it is not approved by the United States Environmental Protection Agency (USEPA) for aquaculture use because it is a marine pollutant and toxic to fish, as it bioaccumulates in the brain, liver, muscle and blood of exposed fish.

10 List of chemical, aqua-medicinal products (AMPs) and other substances for nursery, grow-out and brood ponds

10.1 Approved:

a)	**Probiotics** is an alternative strategy to antimicrobial compounds for disease prevention and control in aquaculture.
b)	**Ethylene di-amino tetra acetic acid (EDTA)** may be used in fish-vet.
c)	**Formalin solution** may be administered for controlling external protozoa, monogenetic treamatodes on finfishes and penaeid shrimp. For controlling external parasites on finfish, a formalin concentration up to 250 microliters per L of the tank- or raceway-water may be used (though only for up to 1 hour) and 15–25 microliters per L in earthen ponds. Pond treatment may be repeated in 5–10 days if needed. Do not apply formalin to ponds in water warmer than 27ºC, when a heavy bloom of phytoplankton is present, or when the concentration of dissolved oxygen is less than 5 mg/L.

d)	**Lime** (calcium oxide/calcium hydroxide) may be used to sterilize ponds and to increase pH and the availability of nutrients.
e)	**Methylene blue** or **malachite green** is safe for use with fish eggs and fry for preventing fungal infections.
f)	**Urea**, a nitrogen-release fertilizer, may be used in aquaculture to accelerate phytoplankton production.
g)	**Single/triple super phosphate (S/TSP)**, a phosphorus-release fertilizer, can be used to accelerate phytoplankton production.
h)	**Muriate of potash (MP)**, a potassium-release fertilizer, may be used in aquaculture to accelerate phytoplankton production in aquaculture ponds.
i)	**Oxytetracycline** may be administered on fish and shrimp/prawn with feed to treat ulcers or bacterial hemorrhagic septicemia. If applied, fish cannot be harvested for food within 30 days.
j)	**Prefuran** (10% nifurpirinol) may be administered on fish with feed to treat microbial infections, fin rot, bacterial gill disease, etc.
k)	**Protozoacide** may be applied on pond water to eliminate protozoa or an agent that so acts.
l)	**Rotenone** is a Restricted Use Pesticide (RUP) product according to USEPA because of its high toxicity to fish. However, it is approved for use in inland culture fisheries, though only by trained professionals using appropriate personal protective equipment (PPE).
m)	**Sulfadimethoxine** and **ormetoprim** may be administered on fish to treat enteric septicemia (caused by bacteria) at a dose of 50 mg per kg of bodyweight per day for 5 consecutive days. If applied, fish cannot be harvested for food within 42 days.
n)	**Table salt**
o)	**Tea seed cake**
p)	**Clove oil:** It is inexpensive and not unpleasant to work with, and thus has been widely used as an anesthetic in fish and crustaceans. However, it is not approved for use on food fish in the US.

10.2 Rejected:

a)	**Dipterex** cannot be used since its AI, trichlorfon/metrifonate, is not approved or registered in Bangladesh, and it is toxic to fish and aquatic organisms. This AI is also not approved by USEPA for use in aquatic environment.
b)	**Phostoxine,** which contains the AI aluminum phosphide, is highly toxic to mammals and humans and thus is not approved for use in aquaculture. However, it can be used for fumigation to protect storage commodities at the warehouse.
c)	**Kerosene** and **diesel** are carcinogenic and thus not approved for use in aquaculture.
d)	As Bangladesh has ratified the Stockholm Convention, the following **POPs** cannot be used: aldrin, chlordane, DDT, dioxins, endrin, heptachlor, HCB, mirex, toxaphene.
e)	**Quinaldine:** While it is an effective anesthetic, it is an irritant to fish, has an unpleasant odor and is a carcinogen, and thus is not approved by the Food and Drug Administration (FDA) for use on food fish in the US.
f)	**Steroids** cannot be used in aquaculture and in the production of fish products.
g)	**Stilbene** and its associated salt and ester cannot be used in aquaculture or in the production of fish products.

h)	As Bangladesh has ratified the Stockholm Convention, the following **POPs** cannot be used: aldrin, chlordane, DDT, dioxins, endrin, heptachlor, HCB, mirex, toxaphene.
i)	**Sumithion** contains fenitrothion as an AI. Although it is approved in Bangladesh for agricultural uses, it is not approved by USEPA for aquaculture use because it is a marine pollutant and toxic to fish, as it bioaccumulates in the brain, liver, muscle and blood of exposed fish.

11 List of chemicals, aqua-medicinal products (AMPs), and other substances for fish hatcheries

11.1 Approved:

a)	**Probiotics** is an alternative strategy to antimicrobial compounds for disease prevention and control in aquaculture.
b)	**Bleaching powder** (calcium hypochlorite) may ONLY be used as a disinfectant/sterilizer at low concentrations (i.e. 0.5%).
c)	**Chorionic gonadotropin** may be administered as an aid in improving spawning function at doses of 50 to 510 IU and 67 to 1816 IU per pound of bodyweight for male and female brood finfish, respectively, through intramuscular injection. Up to three doses may be administered.
d)	**Ethylene di-amino tetra acetic acid (EDTA)** may be used in fish-vet.
e)	A **formalin solution** may be administered for controling external protozoa, monogenetic treamatodes on finfishes and penaeid shrimp, and fungi on fish eggs. For controling external parasites on finfish, a formalin concentration up to 250 microliters per L of the tank water may be used (though only for up to 1 hour). For controling fungi on finfish eggs, apply water in a constant flow of incubating facilities for 15 minutes with 1000 to 2000 microliters per L. Fish tanks may be treated daily until parasite control is achieved. Egg tanks may be treated as often as necessary to prevent the growth of fungi.
f)	**Lime** (calcium oxide/calcium hydroxide) may be used to sterilize, and to increase pH to buffer against pH fluctuations.
g)	**Table salt**
h)	**Methylene blue** is effective against superficial fungal infections of fish. The drug may be used as an alternative to **malachite green** for controling fungus when it is known that the fish to be treated are sensitive. Methylene blue is safe for use with fish eggs and fry for the prevention of fungal infections.
i)	**Oxytetracycline** may be administered on fish and shrimp/prawn with feed to treat ulcer or bacterial hemorrhagic septicemia.
j)	**Prefuran** (10% nifurpirinol) may be administered on fish with feed to treat microbial infection, fin rot, bacterial gill disease, etc.
k)	**Protozoacide** may be applied on pond water to eliminate protozoa or an agent that so acts.
l)	**Sodium thiosulfate** may be used to neutralize chlorine and/or iodine solutions. A range of 2 to 7 parts of sodium thiosulfate to neutralize 1 part chlorine is generally suggested.
m)	**Spawning hormones and inducing agents**: **Human chronic gonadotropin (HCG)** is widely used, as it has an edge over pituitary gland (PG) mainly because it is easy to acquire, is relatively cheap, has a long shelf life and has known and

	consistent potency. HCG alone or in combination with fish pituitary (HCG 70% + PG 30%) has successfully been used to induce breeding in Indian major carps.
n)	**Spawning hormones and inducing agents**: **Ovaprim** is a synthetic hormone that contains both the hormone and the dopamine antagonist. It has been tested successfully on a wide range of freshwater, saltwater and brackish water species. Although Ovaprim is costly (almost double the cost of PG), it has the advantage of known potency and assured breeding response. It comes in ready-to-use form and has a long shelf life, since refrigeration of the solution is not required.
o)	**Spawning hormones and inducing agents**: **PG, LRH (luteinizing release hormone), and FSH (Follicle-stimulating hormone)**
p)	**Tricaine mesylate (TMS, MS-222):** At this time, it is the only **anesthetic** registered for use on food fish in the U.S. However, many compounds have been evaluated experimentally and some are being used on nonfood fish and in research. The recommended dosages for fish baths are 15–50 mg/L for sedation, 50–200 mg/L for induction, 50–100 mg/L for maintenance, and 1 g/L sprayed directly on the gills of large fish. Fish that could be used as human food require a 21-day withdrawal period prior to release of harvest.
q)	**Tricane methanesulfonate** may be administered as an aid in fish handling at hatchery at a doses of 15–330 mg/L water. If applied, fish cannot be harvested for food within 21 days.
r)	**Vitamin pre-mix/multivitamin/vitamin C** may be administered for better growth and survival.
s)	**Clove oil:** It is inexpensive and not unpleasant to work with and thus has been widely used as an anesthetic in fish and crustaceans. However, it is not approved for use on food fish in the U.S.
t)	**17*α*-methyltestosterone** (MT): It can be administered into a starter feed for tilapia.

11.2 Rejected:

a)	**Drugs** specified in **Attachment 4 of European Commission (EC) Directives 2377/90**, 26 June, 1990: chloram phenicol, chloroform, chloropromagin, colchicines, depson, dimetidiazole, metronidazole, nitrofuran, ronodagon.
b)	**Medicines** used in the treatment of animals and the residues of AMPs: authalminties, organo-phosphorous compounds, micotoxin, dye/ink/pigment, polychlorinated biphenyl (PCB) and other organo-chlorine compounds, antibacterial substances, salphonamides and quinolans.
c)	**Quinaldine:** While it is an effective anesthetic, it is an irritant to fish, has an unpleasant odor, and is a carcinogen, and thus is not approved by the FDA for use on food fish in the U.S.
d)	**Steroids** cannot be used in aquaculture or in the production of fish products.
e)	**Stilbene** and its associated salt and ester cannot be used in aquaculture or in the production of fish products.

12 List of chemicals and other substances for fish feed production and storage

12.1 Approved:

a)	**Additives**: 1) Calcium citrate 2) Ascorbic acid 3) Citric acid 4) Sorbic acid 5) Potassium sorbate 6) Calcium sorbate 7) Tetrapotassium diphosphate 8) Monopotassium orthophosphate 9) Benzoic acid 10) Sodium benzoate 11) Potassium benzoate 12) Calcium, benzoate 13) Sulphur dioxide 14) Sodium sulphite 15) Sodium sorbate 16) Sodium ascorbate 17) Sodium, hydrogen sulphite 18) Potassium ascorbate 19) Sodium citrate 20) Monosodium orthophosphate 21) Tetra sodium diphosphate 22) Penta sodium triphosphate 23) Sodium metabisulphite 24) Calcium sulphite 25) Calcium hydrogen sulphite 26) Potassium hydrogen sulphite 27) Sodium triphosphate 28) Sodium polyphosphate 29) Potassium polyphosphate 30) Pentapotassium triphosphate 31) Potassium sulphate 32) Potassium citrate 33) Potassium triphosphate 34) Sodium-calcium polyphosphate 35) Calcium polyphosphate 36) Sorbitol 37) Mannitol 38) Isomalt 39) Maltitol 40) Lactitol 41) Xylitol
b)	**Binders**: 1) Feed grade tricalcium phosphate 2) Feed grade monocalcium phosphate 3) Gelatin 4) Corn gluten meal 5) Spray-dried urea-formaldehyde resin in powder form 6) Food-grade banana powder 7) Food-grade cassava powder 8) Feed-grade banana powder (pellet binder) 9) Industrial-grade banana powder
c)	**Bleaching powder** (calcium hypochlorite) may ONLY be used as a disinfectant/sterilizer at low concentrations (i.e. 0.5%)

12.2 Rejected:

a)	**Anabolizan** (hormones) and other substances: steroids, anabolic steroids, all stilbenes, and substances produced from stilbenes, their salts and esters.
b)	**Antibiotics and pharmacologically active substances:** chloramphenicol, chloroform, chlorpromazine, colchicine, dapsone, dimetridazole, metronidazole, nitrofurans, including metabolites, ronidazole.
c)	**Active pharmacological substances (antibacterial substances):** 1) Sulphonamides, all substances belonging to the sulphonamide group 2) Diamino prymidine derivates: trimethoprim, amoxicillin, ampiciline, benzylpenicillin, cloxacillin, dicloxacillin, oxacillin 3) Quinolones: flumequine, sarafloxacin

	4) Tetracyclines: chlortetracycline, oxytetracycline, tetracycline, chlortetracycline, oxytetracycline.
d)	**Organophosphorus compounds:** azamethiphos, diazinon, acephate, fenitrothion, malathion, quinalphos.
e)	**Environmental contaminants:** organochlorines, DDT, aldrin, endrin, dieldrin, heptachlor, endosulphan, PCBs.
f)	**Chemical substances:** lead, mercury, cadmium, chromium, arsenic.
g)	**Mycotoxin:** aflatoxin (Group B1, B2, G1, G2).
h)	**Anthelmintics:** flubendazole.
i)	**Dyes:** malachite green, leucomalachite green, crystal violet, leucocrystal violet.

13 List of food additives and other chemicals for (food-fish) postharvest handling, processing and storage

13.1 Approved:

a)	**Preservatives:** 1) **Part 1 (max. level of use: good manufacturing practice):** acetic acid, ascorbic acid, calcium ascorbate, erythorbic acid, iso-ascorbic acid, potassium nitrate, potassium nitrite, sodium ascorbate, sodium erythorbate, sodium iso-ascorbate, sodium nitrate, sodium nitrite, wood smoke. 2) **Part 2 (max. level of use: as mentioned):** benzoic acid (1000 ppm), calcium sorbate (1000 ppm), ethyl lauroyl arginate (200 ppm), 4-hexylresorcinol (1 ppm), methyl-p-hydroxy benzoate (1000 ppm), propyl-p-hydroxy benzoate (1000 ppm), methyl paraben (1000 ppm), potassium benzoate (1000 ppm), sodium diacetate (0.25%), sodium metabisulphite (100 ppm), sorbic acid (1000 ppm), sulfurous acid (500 ppm).
b)	**Bleaching powder** (calcium hypochlorite) may ONLY be used as a disinfectant/sterilizer at low concentrations (i.e. 0.5%).

13.2 Rejected:

a)	**Additives**: 1) **Potassium bromate (E924),** a strong oxidizing agent used in bread, is a category 2B carcinogen. 2) **Monosodium glutamate/MSG (E621)** is used as flavor enhancer for its umami taste.
b)	**Preservative**: 1) **Sodium benzoate**: Often added to acidic food products such as sauerkraut, jellies, jams, and hot sauces. May cause hyperactivity in children. 2) **Sodium nitrite**: Often found in preserved meat products. May cause pancreatic cancer and other health problems. 3) **Sodium sulfite (E221):** Often used in some processed foods. May cause closing down the airway altogether, leading to cardiac arrest. 4) **Sulfer dioxide (E220):** Often used on raw fruit and vegetables. May cause bronchial problems, asthma, hypotension/low blood pressure, flushing, tingling sensations, anaphylactic shock. 5) **Propyl paraben (E216):** Often used in beverages, bread products, food dyes, meat, vegetables, and cosmetics. May cause impaired fertility in men and women, and cause endocrine disruption (91% of Americans tested had propyl

	paraben in their urine). 6) **BHA and BHT (E320):** Butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) are used in cereals, chewing gum, potato chips and vegetable oils to keep from changing color, flavor or becoming rancid. Affects neurological system, alters behavior, could potentially cause cancer.
c)	**<u>Artificial coloring:</u>** 1) **Yellow #5:** May cause severe asthma symptoms. 2) **Yellow #6 (E110)** and **yellow tartrazine (E102):** Found in cheese, macaroni, beverages, etc. May cause chromosomal damage. 3) **Red Dye #2:** May cause cancer. 4) **Red Dye #3** & **40 (E124)**: Found in ice cream, candy, bakery products. May cause thyroid cancer and chromosomal damage. 5) **Blue#1** and **Blue#2**: Found in candy, cereal, soft drinks, sports drinks and pet foods. May cause chromosomal damage.
d)	**Processed fats/trans fat:** Often found in fried donuts, cakes, pie crusts, biscuits, frozen pizza, cookies, crackers, margarines. It raises bad (LDL) cholesterol levels and lowers good (HDL) cholesterol levels, and may cause heart disease, stroke, and type 2 diabetes.