DHI SOLUTION

AQUACULTURE – FROM PLANNING TO PRODUCTION

Sustainable solutions for optimised production and minimised environmental impact

Aquaculture as such is an environmentally efficient method for food production, and it is one of the main production methods to meet an increasing global demand for protein. Aquaculture is also highly dependent on ambient water conditions. Allowing for aquaculture to fulfil the expectations and still support healthy wildlife and ecosystems requests for a thorough understanding of production technology as well as environmental technology.

A clean technology approach requires modern fish feed production to maximise production while minimising the use of energy and resources and the resulting wastage. This approach can be highly successful when based on the right specifications and guidelines.

Based on our technological and environmental expertise and experience we supply you with innovative and sustainable solutions in order to meet the challenges of nature while allowing for cost-effective production.

DHI OFFERS

- Farming strategy and DSS
- Recirculation
- Environmental impact assessment
- Monitoring
- Forecasting
- Carrying capacity models
- Farm design optimisation
- Worldwide disease prevention and disease control

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PLANNING AND DESIGN PHASE: OPTIMISING AQUACULTURE STARTS EARLY

Farm design has a high potential for optimising production. Productivity is a function of physical, chemical and biological variables, which themselves depend on the farm design. Both numerical modelling and physical model tests are used to simulate farms in their environment. Integrated studies performed by DHI have proved that changes of a farm design can lead to significant higher profits for farmers.

DISEASE MANAGEMENT AND PREVENTION

Intensively cultured fish and shellfish are naturally susceptible to bacterial, fungal

SUMMARY

CLIENT

Aquaculture farmers and regulatory bodies

CHALLENGE

Optimising development and production while ensuring its sustainability and environmental compatibility including animal health and welfare

SOLUTION

A thorough understanding of biological and hydrological processes enables experts to make qualified decisions on structural design and farming strategy, for an economically feasible and environmentally sustainable cultivation of aquatic resources

VALUE

- Cost-effective production
- Environmental compliance and strategic environmental planning
- Sustainable and optimised farm design and management
- Smooth project approval
- Customised solutions in close collaboration with our clients
- Ensuring animal health and welfare without hampering human health

and parasitic infections, particularly at times of stress. Many problems can be avoided by appropriately quarantining new stock before release into culture tanks or ponds, maintaining water quality and a stress free environment and regular disease monitoring of stock. In the event of disease outbreak, stock can sometimes be effectively treated by salt or freshwater baths, or via veterinarian prescribed treatments.

DHI SERVICES IN THE PLANNING AND DESIGN PHASE:

- Farm design optimisation
- Strategic environmental planning
- Environmental baseline study
- Environmental impact assessments (EIA)
- Applications for environmental clearance/licences

OPTIMAL FARM POSITIONING AND HARVESTING

Based on detailed hydrodynamic models and satellite images, DHI helps to identify optimal locations for fish and shellfish production. Larvae settling rate, growth conditions and carrying capacity for shellfish production will scale directly to the flux of shellfish food and modelled current speed.

Using the services developed by DHI, shellfish producers will be able to select the best production sites and get access to a valuable decision support system, which helps selecting the optimal harvesting time, when size and price is at their best.

OPERATIONAL AND PRODUCTION PHASE: KEEPING UP WITH THE CHALLENGES OF NATURE

The majority of aquaculture facilities are vulnerable to harmful changes such as toxic algae and hypoxic water.

DHI operates web-based water forecasts, which predict current and wave conditions and water quality five days in advance. The forecasts are based on state-of-the-art hydrodynamic and ecological models with online data assimilation from moored instruments and satellite images.

DHI SERVICES IN THE OPERATIONAL AND PRODUCTION PHASE:

- Decision support systems
- Environmental monitoring
- Operational hydrographical and ecological water forecasting for production optimisation

RECIRCULATING AQUACULTURE SYSTEMS (RAS)

Recirculation is a shortcut to efficient and environmentally sustainable aquaculture. Yet, it is probably also the most complex aquaculture system. For optimising production and minimising emissions on RAS farms, we integrate the latest technology with powerful model-based testing.

When done properly, RAS improve farming strategy and water quality and ensure a constant optimisation of production and feeding efficiency. Furthermore they minimise the environmental impact of farming activities in the surroundings.

Photo credits NOAA Fisheries Service http://www.nmfs.noaa.gov/

THE ENVIRONMENT: FOR A LASTING DEVELOPMENT

DHI has developed cost-efficient tools for predicting and assessing potential environmental impacts on a local scale. Applied on a larger scale, these can guide future developments of potential aquaculture sites.

Coupled hydrodynamic ecosystem models can, amongst others, be applied to quantify eutrophication effects, oxygen conditions below fish cages or loss and spread of pharmaceuticals and copper from impregnated nets. Spill models serve to quantify the settling of faeces and food pellets and their subsequent fate.

DHI's environmental services in aquaculture include:

- Carrying capacity models
- Modelling of farming effects
- Spill models
- Compensative cultivation and Integrated Multi-Trophic Aquaculture (IMTA)
- Advice for designing zero-discharge fish farms
- Feed regime optimisation
- Biological and ecological waste treatment methods
- In case of toxic pollutions or various diseases collection of information and performance of risk assessments which can be part of risk management after environmental catastrophes
- Advice on procedures to be taken in case of reduced animal health or animal welfare problems

CLOSE COLLABORATION FOR TAILOR-MADE SOLUTIONS

Our extensive experience and knowledge allows us to provide quantifications and innovative solutions to challenges faced by aquaculture companies, whether operating in inland waters or at offshore locations.

We believe that close collaboration with our clients, technology and knowledge transfer as well as multidisciplinary expert teams are key parameters in ensuring the highest value for our clients on time and at cost.

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