



Unmanned Fish Farming-the 4th Generation of Aquaculture

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Contents



1. The background of 4th Generation of Aquaculture

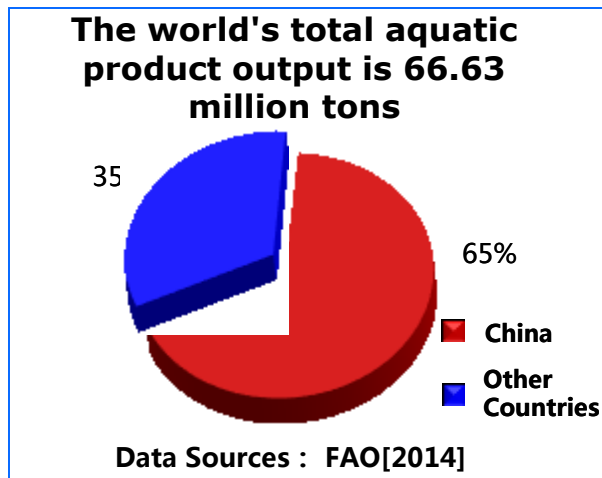
2. The Characteristics of 4th Generation of Aquaculture

3. The Main research fields of 4th Generation of Aquaculture

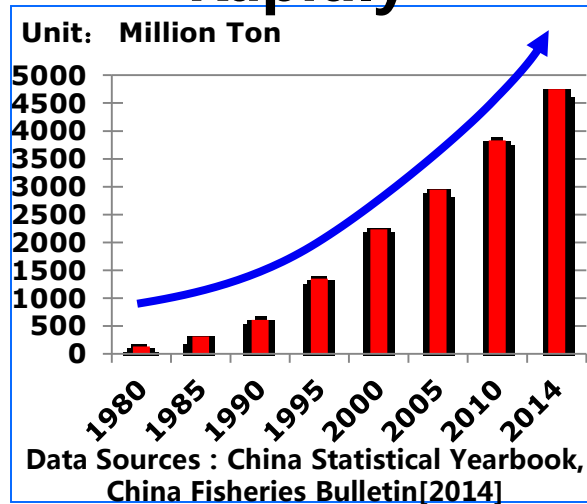
4. Prospects and Strategies of 4th Generation of Aquaculture

1 Background of the 4th Generation of Aquaculture

Biggest Production Country in World



Developing Rapidly



1/3 of Animal Protein

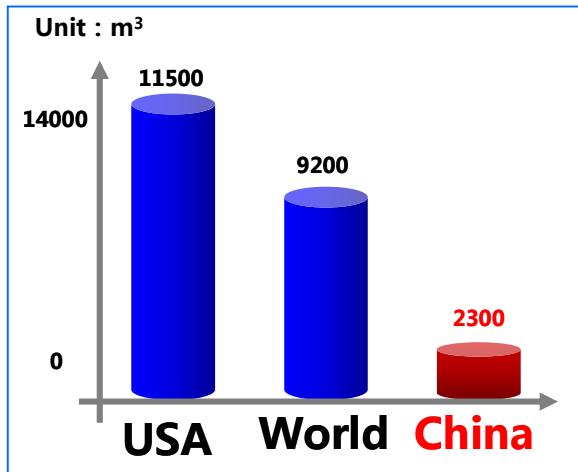


Played a very important role for China food security

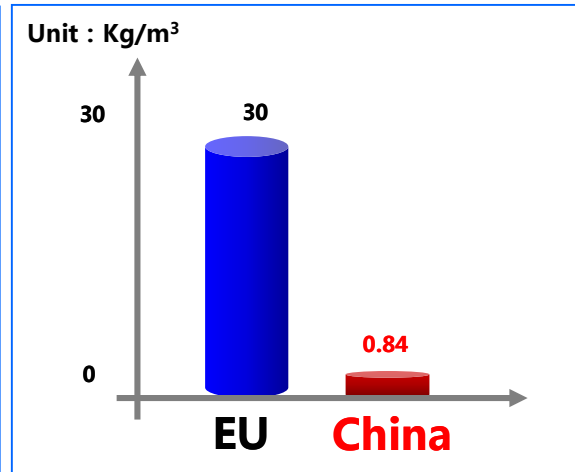
1 Background of the 4th Generation of Aquaculture

□ Low labor productivity

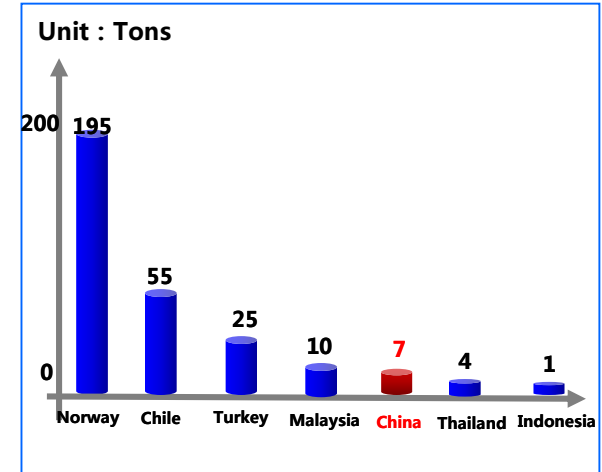
Per Capita Water Resources



Aquaculture Water Utilization Rate



Labor productivity



Waste of resources 、 Low production efficiency 、 High risk of breeding

1

Background of the 4th Generation of Aquaculture

□ Ecological environment deteriorates

- 70% of rivers and lakes in China have different degrees of pollution.
- China's pond aquaculture has a high rate of direct discharge.
- Lots of China's coastal zone is also polluted for aquaculture.



1 Background of the 4th Generation of Aquaculture

□ Labor costs have risen sharply and severe aging

- 1) Labor cost ratio 70%
- 2) The average age of the labor force is 55 years old.
- 3) Speeding up rural aging



Who will culture fish after 20 years?

1 Background of the 4th Generation of Aquaculture

□ what's the solutions for Chinese fish farming in the future?

- Resource conservation
- Output efficiency
- Environmentally friendly
- Product safety

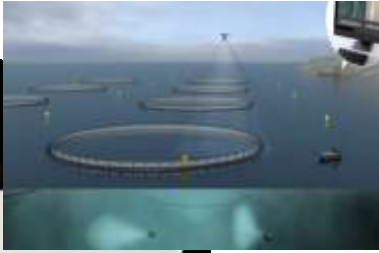


Upgrade

- Equipment
- Intelligent
- Networking
- Unmanned

"Aquaculture 1.0--4.0"

From traditional aquatic products, to factory, to automation, to intelligence



Aquaculture 4.0

Unmanned production:
Internet of Things, big data, artificial intelligence, robots



Aquaculture 3.0

Automated manufacturing:
Using IoT technology to manage computer software as the core



Aquaculture 2.0

Equipment production:
Mechanization and facility of aquatic products, agricultural production relies on mechanical power and electricity



Aquaculture 1.0

Smallholder production:
Relies on manual, hand tools, experience based farming

19th century

20th century

21th century

Contents



1. The background of 4th Generation of Aquaculture

2. The Characteristics of 4th Generation of Aquaculture

3. The Main research fields of 4th Generation of Aquaculture

4. Prospects and Strategies of 4th Generation of Aquaculture

2 Characteristics of 4th Generation of Aquaculture

□ **Basic Concept**

— The highest generation of modern

aquaculture

□ **Networking Monitoring**

□ **Aquaculture Equipment**

□ **Intelligent Equipment**

□ **Ummanned Operation**

2 Basic Connotation of 4th Generation of Aquaculture

□ Basic Characteristics

—— High integration of **information technologies**

- Internet of Things
- Big Data
- Artificial Intelligent
- Robot

2

Basic Connotation of 4th Generation of Aquaculture

□ **Basic Characteristics**

— **Ubiquitous Intelligence**

- **Whole Chain**
- **All Industries**
- **Whole Process**
- **All Regions**

2

Basic Connotation of 4th Generation of Aquaculture

Basic characteristics

— Unmanned system

- Unmanned pond culture**
- Unmanned Land-based factory culture**
- Unmanned net cage culture**
- Unmanned raft culture**

Contents



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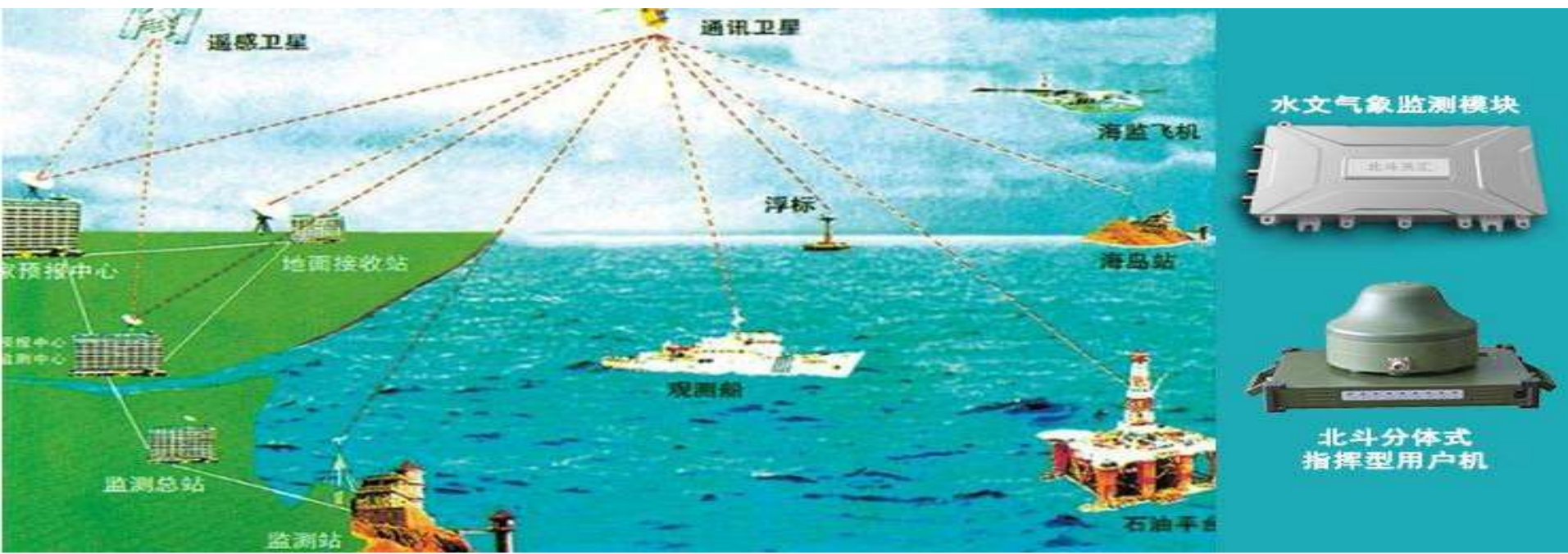
4. Prospects and Strategies of 4th Generation of Aquaculture

3 The research fields of 4th Generation of Aquaculture

- ❑ Fishery resources, environment and ecological monitoring, early warning system with Space technology
- ❑ Unmanned aquaculture production system
- ❑ Intelligent aquatic product processing and logistics system

1.1 Comprehensively integration and intelligent technology of marine and terrestrial waters spatial information acquisition

- ❑ Research on remote sensing imaging mechanism and quantitative inversion of fishery resource environmental factors
- ❑ High frequency radar marine environment monitoring technology
- ❑ Aquaculture water sensor monitoring network, data fusion technology of Beidou satellite, drone and ground sensor network



1.2 The automation, quantification and real-time technology of aquaculture environmental spatial information processing

- Spatial information cognitive model and intelligent interpretation of remote sensing images
- Cooperative processing and fusion of multi-sensor remote sensing information
- An integrated space platform built to observe, monitor and warn the environment and disaster



1.3 The network of aquaculture environment ecological monitoring, early warning, decision information release and application



- ◆ Big data processing technology of breeding decision information
- ◆ Knowledge discovery and intelligent service technologies
- ◆ Develop intelligent application terminals
- ◆ System integration technology

2.1 The unmanned technique in land-based factory farming water

- Technology in intelligent breeding based on big data for gene and fish phenotyping
- Technology in status dynamic identification and fault diagnosis of circulating water equipment
- Development of variable intelligent baiter for different scenarios
- The robot developed for inspection and daily management of circulating aquaculture factory



Automatic feeding device



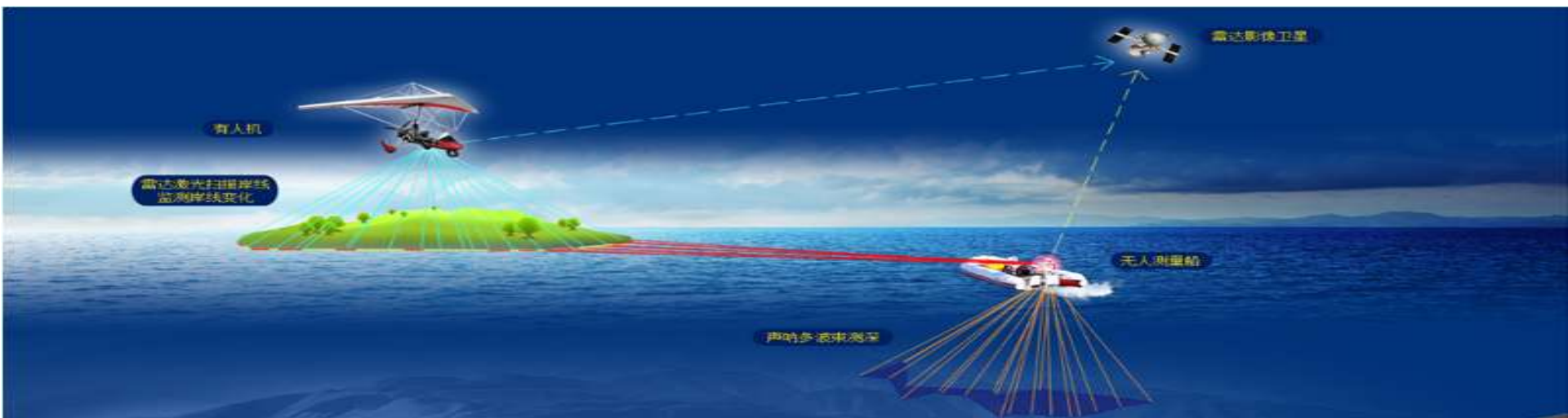
2.2 The unmanned technology in circulating water engineering pond culture

- The breakthrough technology in the low cost and high reliability micronano sensor of circulating water environmental parameters
- Development of variable intelligent baiter for different scenarios
- The key technology in status dynamic identification and fault diagnosis of circulating water equipment
- A pond group optimization management and decision-making platform developed based on big data and the Internet.



2.3 Reasearching on unmanned aquaculture technology of offshore cage, large seine net and marine ranching

- ❑ Study on Multi-source Sensor Data Fusion Technology for Marine Eco-environment Based on the Trinity of Beidou Satellite, UAV and Water Surface Sensor Network ;
- ❑ Research and development on Super intelligent feeding system of multi-source information fusion based on water quality, facilities behavior and residual bait in order to achieve precise feeding of cage culture;
- ❑ Advanced layout of robot technology such as detection of deep-water cage underwater, dead fish recovery, net cleaning, net lifting, live fish driving, fishing and harvestin.



2.4 Advanced layout of unmanned Technology for Fishing boat

- ❑ Researching on special intelligent sensors for aquaculture and marine environment detection and Beidou information remote transmission equipment
- ❑ Developing on the key technologies such as intelligent treatment and control equipment for circulating water on fishing boat, automatic feeding and digital fish separator
- ❑ Research on intelligent energy supply technology on deep sea aquaculture platform, and developing on complementary power generation technology of wind, light and tidal.
- ❑ Researches on the key technologies of aquaponics culture in deep sea to build a aquaponics recirculating aquaculture system.



3 Intelligent aquatic product processing and logistics system

3.1 Breakthrough technologies of cold chain logistics of aquatic products and quality and safety control



Instant freshness keeping technology and intelligent equipment



Hazard detection, in-site trace screening and intelligent pretreating



Aquatic product risk monitoring and athermal bacteria controlling technology



Dynamic monitoring of cold chain circulation and efficient and low temperature logistics equipment

3.2 Comprehensively conquering green, safe and efficient intelligent technology for intensive processing of aquatic products



Tackling key technologies of sensor for aquatic product intensive processing

Realizing the automation and intelligence of machine vision

Developing high value key equipment such as enzymes, fermentation and bioreactors

Contents



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1. Advanced layout of new generation information technology

- **1. Accurately grasp the entry point of Fishery 4.0, and strengthen basic research and key technology research.**
- **Advance layout.**
- **Establish special subsidies to leverage social investment and promote the basic research and application demonstration of modern information technology in fisheries, such as the Internet of Things, big data, artificial intelligence, robots and so on.**
- **Promote the input of information infrastructure such as mobile communications, broadband, computers and smart phones.**

2. Industry pulling

- **2. Leading enterprises demonstration.**
- **Leading enterprises take the responsibility of leading industries, taking the lead in promoting and upgrading modern agriculture, and leading the development of industries and regions.**
- **Leading enterprises, star enterprises, Internet of Things, communications, logistics and so on, have resources, users, understand the aquatic industry itself, understand the Internet of Things, can rely on their own resources advantages, through the Internet tools to infiltrate the fishery.**

3. System support

3. Breeding Industry Ecology

- Intelligent Equipment Industry

- Modern Information Technology Industry

- New Generation Information Service Industry

- Industry Support Policy

4. Talent is the Root

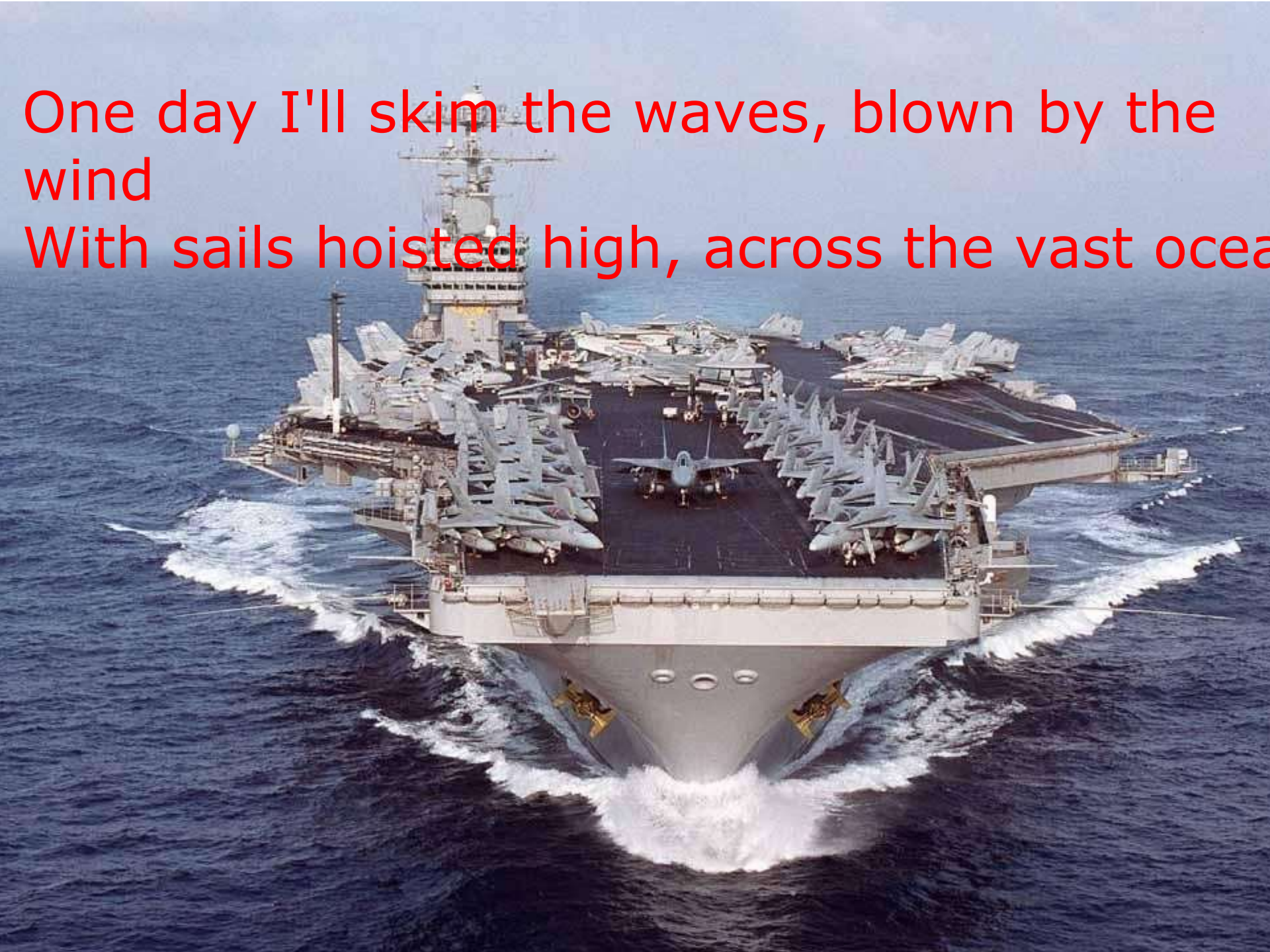
- **4. Fostering Information Talents and Enhancing high education**
- ***Internet of Things***
- ***Big Data***
- ***Artificial Intelligence***
- ***Robot***

Xiongguan Road is as iron as iron

**And now we're moving from beginning
to end**



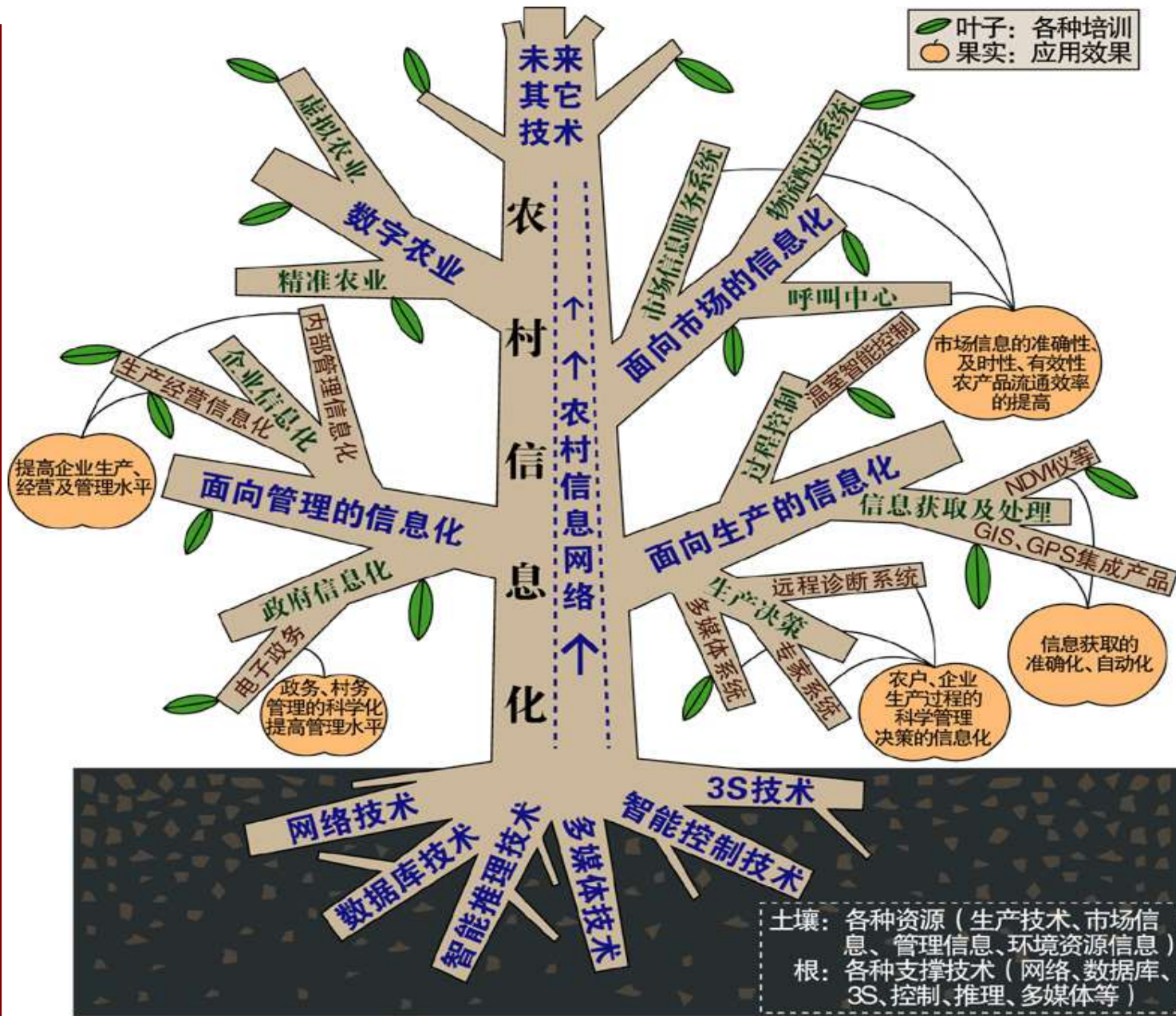
One day I'll skim the waves, blown by the
wind
With sails hoisted high, across the vast ocean



Work for promoting and realizing the development of Aquaculture 4.0

United unity is strength

Forge ahead hand in hand





雄关漫道真如铁

而今迈步从头越

长风破浪会有时

直挂云帆济沧海！



为推进和实现渔业4.0发展做出贡献

万众一心众志成城

开拓进取携手共进

