



WorldFish
C E N T E R



The WorldFish Center

CHINA AND THE WORLDFISH CENTER **POOLING RESOURCES**

China and The WorldFish Center: Pooling Resources

An estimated 630 million Asians live on less than a dollar a day. Many of the poorest Asians depend on relatively cheap fish for much or most of their limited intake of animal protein. As the largest producer and consumer of aquatic products in the world, China has an assured role in safeguarding the food security of these poor Asians — a growing challenge in the face of the continued depletion of wild fish stocks coupled with growing demand for seafood. Recognizing this, The WorldFish Center launched a partnership with China more than a decade ago.

In December 2006, China and WorldFish renewed their partnership with a new memorandum of understanding, research

framework and roadmap for the future. A stakeholder workshop held that month in Wuxi, Jiangsu Province, identified key priorities for China under three broad research themes:

- genetic improvement,
- socioeconomic impact and
- environmental protection.

The principle objectives of the program are to (i) develop improved strains of farmed fish species, (ii) improve the social and economic impacts of aquaculture and capture fisheries, and (iii) ensure the environmental sustainability of these systems, thereby supporting the Chinese government's commitment to poverty reduction and rural development. The

FLYING FISH

Soaring fish production to meet expanding domestic and international demand makes China more dependent on its fisheries sector than ever before. Seafood provides more than 20% of animal protein intake in China, and domestic demand is forecast to grow by more than 30% from 1997 to 2020, as rapid economic growth, urbanization and market development drive up fish consumption per capita from 26.5 kilograms per year to 36 kilograms.

Production has expanded by 14.3% annually over the past decade. All new capacity since 1998 has derived from aquaculture, whose profits attract ever increasing numbers of farmers, making it China's fastest-growing food-production subsector, accounting in 2004 for 75% of global aquaculture production. Today, China accounts for 34% of global production from aquaculture and capture fisheries combined. Exports of aquatic products earn enough foreign exchange to pay for 64% of the country's bill for food imports. More than 13 million people work in China's fisheries and aquaculture sector, earning wages in 2005 that were 82% higher than the average for agricultural labor.

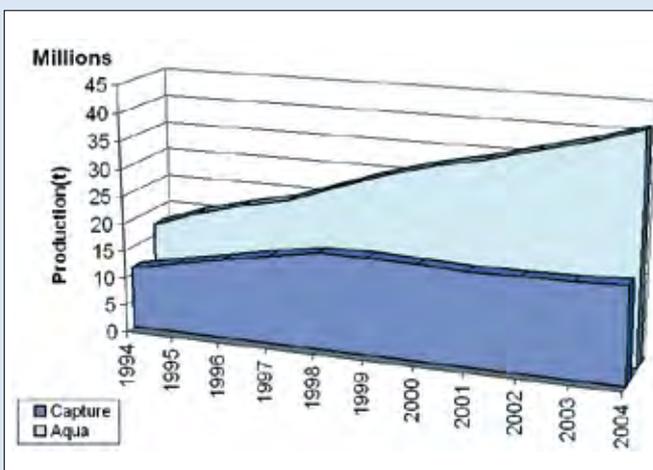


Figure 1: Since growth in Chinese capture fisheries hit a ceiling in 1998, aquaculture alone has expanded to meet the growing demand for fish.

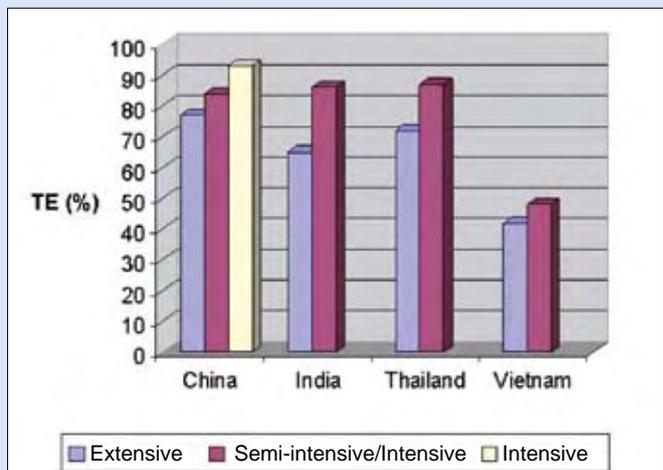


Figure 2: The technical efficiency (TE) of Chinese aquaculture compares favorably with that of its neighbors.

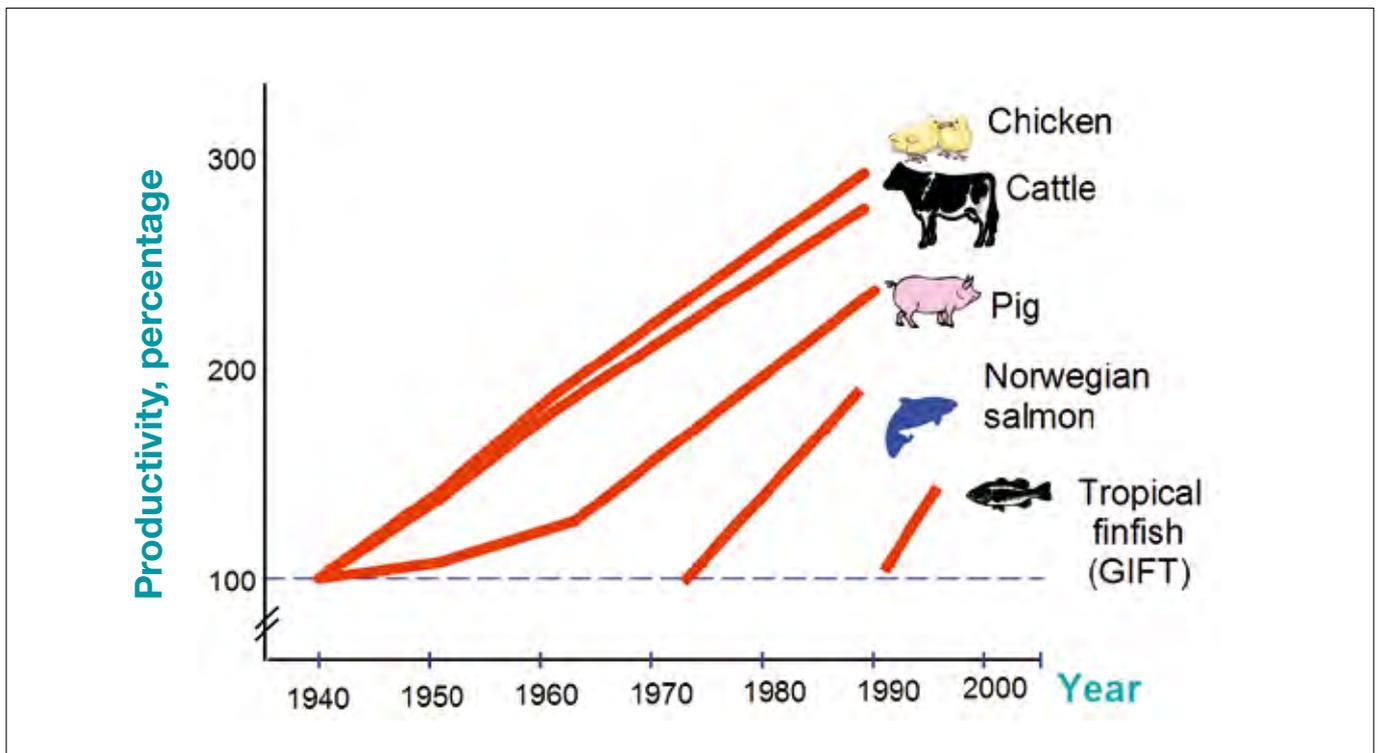


Figure 3: Selective breeding has brought substantial gains over the past several decades in the productivity of key livestock species, but only relatively recently in food fish.

China-WorldFish partnership also facilitates South-South cooperation, as the Chinese Academy of Fisheries Science (CAFS) and WorldFish have agreed to collaborate with the New Partnership for Africa's Development on a scientific research program focused in particular on fish breeding.

GENETIC IMPROVEMENT

The past several decades have witnessed unprecedented strides in the selective breeding of crops and livestock for substantial gains in productivity (see Figure 3). However, food fish have been genetically improved only relatively recently. That 70% of carps cultured in China originate in the wild illustrates the huge potential yet to be realized for boosting the productivity of aquaculture through genetically improved fish strains. With partners in Africa and Asia, and not least in China, WorldFish has taken the lead in developing improved strains of tilapia and carp.

International Network on Genetics in Aquaculture. China is one of 13 developing country members of the International Network on Genetics in Aquaculture, through the participation of Shanghai Fisheries University and the Freshwater Fisheries Research Center (FFRC) of CAFS in Wuxi. Funded by Norway and WorldFish, the network also includes

ten advanced research institutions and four international or regional organizations to advance its aim to strengthen capacity and foster regional and international cooperation in this vital field.

The network aims to preserve fish biodiversity and help national and regional fish-breeding programs develop appropriate strategies. In accordance with strict quarantine protocols, it facilitates the transfer of fish germplasm (genetic material) and related information, in particular for genetically improving carp and tilapia. Through the network, 11 countries have received WorldFish's genetically superior tilapia strains and related fish-breeding technology, and many of these countries have subsequently developed their own capacity in fish breeding. Nine training programs organized under the network have benefited 210 participants from 14 Asian, African, Pacific and Latin American countries.

Genetic Improvement of Fish and Shrimp. Funded by the European Community and the German Federal Ministry for Economic Cooperation and Development (BMZ), this program, undertaken in partnership with FFRC, has three major components: (i) evaluating the impact of genetically improved farmed tilapia (GIFT) strains disseminated between

1994 and 1999, (ii) transferring germplasm from Malaysia to Wuxi, and (iii) training FFRC staff in quantitative genetics at FFRC and partner institutes in Malaysia. The current phase of research focuses on introducing and disseminating the latest generation of GIFT tilapia from Malaysia, which fits closely with the first two projects cited in the following section.

SOCIOECONOMIC IMPACT

Central to evaluating and improving any economic activity is the question of how well it serves the social and economic interests of its practitioners and society at large. Upcoming activities, through which WorldFish and its Chinese partners aim to improve the socioeconomic impact of fisheries and aquaculture, include the formulation of strategies for their sustainable development focusing on environmental sustainability and benefits to rural livelihoods, and supporting the Chinese government policy objective of improving rural living conditions.

China's accession to the World Trade Organization has had significant implications for its export fisheries, including the need to meet international standards of food quality and safety. The costs, benefits and impacts of implementation are of keen interest to the fisheries sector and priority topics for research. Collaborative work with China addresses these

questions and assesses the potential benefits for small-scale farmers of enhanced linkages to domestic and international markets.

As fishery and aquaculture research has traditionally been concentrated in eastern and southern China, a WorldFish priority is to explore opportunities to assist impoverished communities in central and southwestern China, where many natural resources that support rural livelihoods are severely degraded or under threat. Tackling this problem requires a thorough understanding of how poverty and environmental concerns are linked. WorldFish and its Chinese partners are currently developing projects that tackle poverty through improved natural resource management, emphasizing biodiversity, water productivity and wetland management.

Achieving Greater Food Security and Eliminating Poverty by Dissemination of Improved Carp Strains to Fish Farmers.

Fish farming is fast becoming a major industry in Asian developing countries, essential for supplying food fish and contributing to economic growth. Carp is the most important species in aquaculture production and a favorite in Asia because of its good taste and low price. In many poor communities, both rural and urban, carp is the only affordable source of animal protein. With these considerations



Figure 4: Aquaculture has developed in China primarily in the southeast, with yield in other provinces, especially in poorer western regions, languishing below 5 tonnes per hectare.

Overall suitability for pond aquaculture - Henan

- Least suitable
- Moderately suitable
- Suitable
- Most suitable



Figure 5: A map of Henan Province combines weighted data (shown on inset maps) on water availability, land conditions, input requirements and marketing possibilities to rate areas of the province according to their overall suitability for aquaculture.

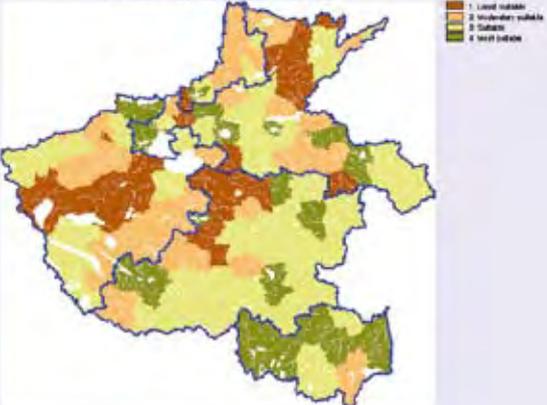
Suitability based on water availability



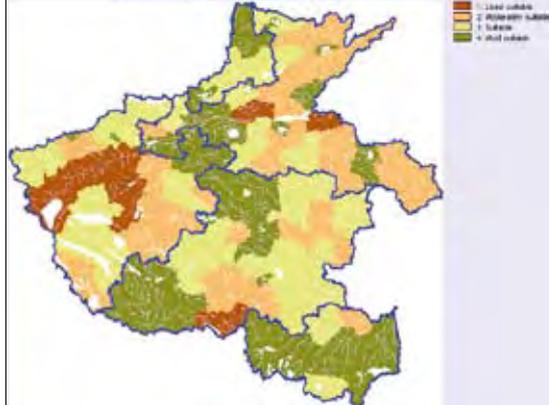
Suitability based on land conditions



Suitability based on inputs



Suitability based on market



in mind, measures must be taken to ensure that fish farming, especially of carp, remains effective and sustainable in Asia.

WorldFish responded to this need by formulating a collaborative project on the genetic improvement of carp in Asia that was implemented in two phases. Phase I, beginning in 1997, focused on training local staff, identifying foundation carp populations, initiating genetic improvement programs and defining strategies for the effective dissemination of the improved stock. Phase II builds on this work by (i) establishing and consolidating national selective breeding programs in Bangladesh, China, India, Indonesia, Thailand and Vietnam; (ii) developing improved strains of indigenous carps in these countries; (iii) testing the improved carp strains and demonstrating their advantages through on-farm studies; (iv) training fish farmers in optimum farm management, including the use of improved fish; (v) implementing national strategies to disseminate improved carps to poor fish farmers; (vi) training at least one scientist from each participating country to the M.Sc. and Ph.D. level; and (vii) enhancing the capacity of four or five local staffers in each country to train farmers and extension officers. The ultimate project aims are higher aquaculture productivity and income, as well as more protein consumption by fish farmers and their communities.

Activities in China in the project funded by the Asian Development Bank have been undertaken in partnership with Shanghai Fisheries University (Phase I), the Center for Chinese Agricultural Policy (Phase II) and FFRC (Phases I and II).

Assessing the Farm-Level Impact of GIFT in China and the Philippines. The aim of this project, funded by Deutsche Gesellschaft für Technische Zusammenarbeit GmbH, the German enterprise for sustainable development through international cooperation, is to assess the impact of GIFT on the productivity, income, food security and livelihood of small-scale farmers, including an analysis of its potential for poverty reduction. China was chosen for study because it is the world's largest producer of tilapia, and the Philippines because it was the first country to adopt GIFT strains and is the third largest

producer of tilapia. While GIFT dissemination in the Philippines was carried out largely by the nonprofit GIFT Foundation, in China GIFT fingerlings were distributed through government agencies. Researchers will assess the different dissemination strategies in terms of impact and adoption, the internal rate of return on investments, and farm-level impact. Activities in China are carried out in partnership with FFRC.

Determination of High-Potential Aquaculture Development Areas and Impact in Africa and Asia. WorldFish Center has worked with partners to develop geographic information systems and case studies to identify areas in Africa and Asia with high potential for aquaculture development. The resulting recommendations and scenario maps are important decision-support tools for planners, development extension workers and researchers for promoting aquaculture to small and marginal farmers. As aquaculture remains a new technology in much of Asia — and a very new technology in Africa — these tools help national research partners and farmers adapt technologies and innovations to their local conditions. This BMZ-funded project is carried out in China in partnership with FFRC and CAFS.

ENVIRONMENTAL PROTECTION

No economic activity can truly benefit its practitioners and the larger society unless it is environmentally sustainable. Aquaculture will support the Chinese government's commitment to poverty reduction and rural development only if it is practiced in ways that are in tune with local environmental processes, potentialities and constraints. Ensuring that aquaculture develops in environmentally sustainable directions depends on accurately characterizing environments and their potential for aquaculture and then conveying this information clearly to policymakers at all levels of government and to farmers.

Community-Based Fish Culture in Irrigation Systems and Seasonal Floodplains. Seasonal floods along the Indus-Ganges and Mekong rivers in Asia, and the Niger River in Africa, remove farmland from productivity for months at a time. In this project, researchers explore options for integrating fish and other living aquatic resources into irrigation systems

and seasonal flood plains to enhance their productivity for poor farmers. Researchers from WorldFish and other international research centers work with national partners to explore institutional options for sharing benefits from integrated living aquatic resources. The project aims to sustain and restore declining inland capture fisheries, lower fish prices, and develop community-based means to ensure sustainable rural livelihoods in Asia and Africa.

Funded by the Challenge Program on Water for Food of the Consultative Group on International Agricultural Research (CGIAR), activities in China are conducted in partnership with FFRC, CAFS and Yunnan Fisheries Department.

Strategies and Options for Increasing and Sustaining Fisheries and Aquaculture Production to Benefit Poor Households in Asia.

Recommendations from this AsiaFish study are used by Bangladesh, China, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand and Vietnam to develop strategies, national action plans, and options for sustaining and increasing fish supplies. AsiaFish is a partnership of 35 institutions set up to create a first-of-a-kind, multi-market model that allows these nine countries to make projections of supply and demand for fish, both cultured and wild. This information is vital for projecting exports and imports in countries where fish is

a source of both foreign exchange and basic sustenance — in some cases providing up to 70% of annual protein consumed.

The AsiaFish model helps Asian countries determine the most effective, socially acceptable, and environmentally friendly forms of aquaculture. Associated projects to develop and disseminate technologies for culturing affordable herbivorous fish such as carp and tilapia can boost productivity for a wide range of farmers. In this recently completed study, funded by the Asian Development Bank, activities in China were undertaken in partnership with the Center for Chinese Agricultural Policy of the Chinese Academy of Agricultural Science, FFRC and Shanghai Fisheries University.

FishBase. This global online information source (www.fishbase.org) continues to grow and garner recognition as the world's premier source of information on fish. A consortium of research organizations administers FishBase, with WorldFish playing the central role in database development and management, with funding provided primarily by the European Commission. In China, FishBase activities are undertaken with the Chinese Academy of Fisheries Science, Chinese Academy of Science, Institute of Hydrobiology, and South China Institute of Oceanology.

WorldFish in China

The WorldFish China office was established in April 2006 to facilitate China-WorldFish collaboration. CAFS and WorldFish recently agreed to establish a second WorldFish office in Beijing.

WorldFish Center China Office

c/o Mr. Weidong Zhou, Senior Advisor
E-mail : worldfish-china@cgiar.org
Telephone : +86-510-8555-9919
Postal address : P.O. Box 214081, People's Republic of China
Location : 9 West Shanshui Road, Wuxi, Jiangsu Province

Key contact:

Dr. Natasja Sheriff (n.sheriff@cgiar.org), Regional Coordinator for East and Southeast Asia and Project Coordinator for Community-Based Fish Culture in Seasonal Water Bodies under the Policy, Economics and Social Science Discipline of:

The WorldFish Center

P.O. Box 500 GPO
10670 Penang
Malaysia
Telephone : +60-4-620-2134
Fax : +60-4-626-5530

WORLD FISH OFFICES

BANGLADESH

The WorldFish Center – Bangladesh Office

Mail : House 22B, Road 7, Block-F, Banani,
Dhaka 1213, BANGLADESH
Tel : (+880-2) 881 3250, (+880-2) 881 4624
Fax : (+880-2) 881 1151
Email : worldfish-bangladesh@cgiar.org

CAMBODIA

The WorldFish Center – Greater Mekong Office

Mail : P.O. Box 1135 (Wat Phnom),
Phnom Penh, CAMBODIA

Office : #35, Street 71
(Cnr of Mao Tse Tong Blvd.),
Sangkat Beng Keng Kang 1,
Phnom Penh, CAMBODIA

Tel : (+855) 23 223 208
Fax : (+855) 23 223 209
Email : worldfish-cambodia@cgiar.org

CAMEROON

The WorldFish Center – Cameroon Office

Humid Forest Center, B.P. 2008 (Messa),
Yaoundé, CAMEROON

Mail : IITA-Cameroon
c/o L.W. Lambourn & Co. Ltd.,
Carolyn House, 26 Dingwall Road,
Croydon CR9 3EE, ENGLAND

Tel : (+237) 223 7434, (+237) 223 7522
Fax : (+237) 223 7437
Email : worldfish-cameroon@cgiar.org

CHINA

The WorldFish Center – China Office

9 West Shanshui Road, Wuxi City,
Jiangsu Province,
P.O. Box 214081, P.R. CHINA
Tel : (+86-510) 8555 9919
Email : worldfish-china@cgiar.org

DEMOCRATIC REPUBLIC OF THE CONGO

The WorldFish Center – DRC Office

Boulevard du 30 Juin Nr 2515,
Immeuble Aforia ex. Shell, 6ème Etage,
Gombe, Kinshasa

RÉPUBLIQUE DÉMOCRATIQUE DU CONGO
Tel : (+243) 81 756 8724
Email : mhoeckstra@cgiar.org

EGYPT

The WorldFish Center – Egypt Office

Abbassa Research Center
Abbassa, Abou-Hammad, Sharkia, EGYPT
Tel : (+205) 5340 8165
Fax : (+205) 5340 5578

The WorldFish Center – Cairo Office

3, Abou El Feda Street,
Zamalek, Cairo 11211, EGYPT
Mail : P.O. Box 1261, Maadi, Cairo, EGYPT
Tel : (+202) 2736 4114
Fax : (+202) 2736 4112
Email : worldfish-egypt@cgiar.org

MALAWI

The WorldFish Center – Malawi Office

National Aquaculture Center, Domasi, MALAWI
P.O. Box 229, Zomba, MALAWI
Tel : (+265-1) 536 298, (+265-1) 536 274,
Fax : (+265-1) 536 274
Email : worldfish-malawi@cgiar.org

MALAYSIA (Headquarters)

The WorldFish Center – Malaysia Office
Jalan Batu Maung, Batu Maung,
11960 Bayan Lepas, Penang, MALAYSIA
Mail : P.O. Box 500, GPO 10670,
Penang, MALAYSIA

Tel : (+60-4) 626 1606
Fax : (+60-4) 626 5530
Email : worldfishcenter@cgiar.org

NEW CALEDONIA

The WorldFish Center – South Pacific Office

Mail : c/o The Secretariat
of the Pacific Community
B.P. D5, 98848 Nouméa
Cedex, NEW CALEDONIA

Tel : (+687) 262 000
Fax : (+687) 263 818
Email : worldfish-newcaledonia@cgiar.org

The PHILIPPINES

The WorldFish Center – Philippines Office

Khush Hall, IRRI College, Los Baños,
Laguna 4031, PHILIPPINES
Mail : M.C.P.O. Box 2631,
0718 Makati City, PHILIPPINES
Tel : (+63-2) 580 5659, (+63-49) 536 2701
Fax : (+63-2) 891 1292, (+63-49) 536 0202
Email : worldfish-philippines@cgiar.org

SOLOMON ISLANDS

The WorldFish Center – Solomon Islands Office

Gizo Office
P.O. Box 77, SOLOMON ISLANDS
Tel : (+677) 600 22
Fax : (+677) 605 34

The WorldFish Center – Honiara Office

P.O. Box 438, SOLOMON ISLANDS
Tel : (+677) 250 90
Fax : (+677) 232 96
Email : worldfish-solomon@cgiar.org

ZAMBIA

The WorldFish Center – Zambia Office

2 Dunduza Chisidza Crescent,
Longacres, Lusaka, ZAMBIA
Mail : P.O. Box 51289,
Ridgeway, Lusaka, ZAMBIA
Tel : (+260) 211 257939/40
Fax : (+260) 211 257941
Email : worldfish-zambia@cgiar.org



WorldFish
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For further information on publications contact:
Business Development and Communications Division

The WorldFish Center

P.O. Box 500 GPO, 10670 Penang, Malaysia
Tel : (+60-4) 626 1606 | Fax : (+60-4) 626 5530 | Email : worldfishcenter@cgiar.org

This publication may be referred to as: *The WorldFish Center. 2007. China and The WorldFish Center: Pooling Resources. Brochure No. 1716.*
This publication is also available from: www.worldfishcenter.org

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