

# **An Overview of New Agricultural Policies for Taiwan in 2018**

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## **INTRODUCTION**

Agricultural production is able to provide a lot of additional benefits such as positive externality and the nature of public goods. That is, agriculture is able to create a lot of non-market values during the management process, such as land security, resource sustainability, and food security. Because the value of a part of these benefits is not easy to be measured, the GDP calculated based on agricultural products is underestimated, to further derive the problem of uneven resource distribution with other non-agricultural industries (Liu, 2017). Taiwan had 797,000 hectares under cultivation, accounting for 22.1% of its total land area. Most of Taiwan's farms are small-scale and operated by family; the average size of farms is about 1.1 hectares in 2015. In 2016, 557,000 people were employed in agriculture, accounting for 5% of the total employed population in Taiwan. The average age of farmers is 62. Regarding agricultural economy, in 2016, Taiwan's food self-sufficiency rate was 31% (as measured by calories). The average income of per farm household was NT\$1.02 million, of which 23% was from agriculture. Agricultural GDP accounted for about 1.8% of national GDP. If the processed agri-products and the food and beverage industry are calculated, the share of agricultural GDP will be 7.3%. This study will introduce the agricultural development of Taiwan and the organization of Council of Agriculture in Taiwan, then analyze the content of the new agricultural policies and goals recently, and the conclusions and suggestions will be given in the end.

### **Agricultural Development in Taiwan**

The organization of COA (the Council of Agriculture) is shown in Fig. 1. It is composed of the department of planning, animal industry, farmers' services, science and technology, international affairs, irrigation and engineering, and so on. COA is responsible for the decision-making of agricultural policies including agriculture and food, fishery, forestry, livestock, animal health aspects etc. The budget for 2016 for the COA and all affiliated agencies provided funding for a total of 7,734 persons, including: 4,674 full-time staff, 102 hirees, 404 contract employees, 7 security personnel, 2,141 technical staff, 149 drivers, and 257 custodial workers. The offices of the COA per se (i.e. excluding affiliated agencies) accounted for 402 of these persons, including 330 full-time staff, 15 hirees, 12 contract employees, 7 security personnel, 10 technical staff, 15 drivers, and 13 custodial workers (COA, 2018b).

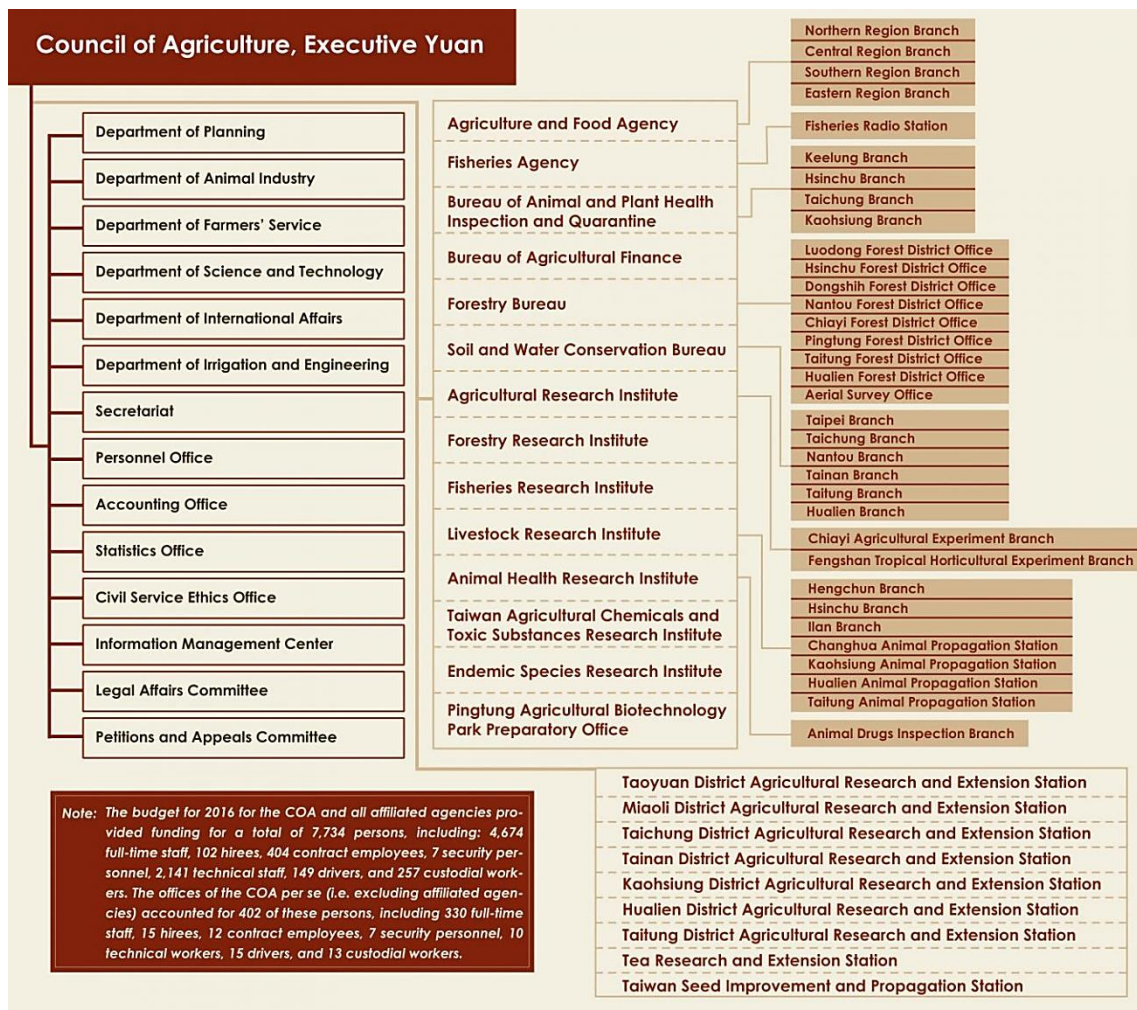


Fig. 1. The organization of Council of Agriculture in Taiwan  
 Source: <https://eng.coa.gov.tw/ws.php?id=2505380>

Regarding the value of agricultural production, the total value of Taiwan's agricultural production in 2015 was NT\$500.9 billion, of which farm crops accounted for 48.8%, forestry for less than 0.1%, livestock for 32.7%, and fishery products for 18.4%. The production value in 2015 for farm crops, forestry, fisheries and livestock is listed as follows: (1) The value of production of farm crops was NT\$244.4 billion, accounting for 48.8% of the total value of agricultural production. The main product is fruits with the share of 37.4%, followed by vegetables (26.3%), rice (15.3%), flowers (6.8%), special-use crops (5.2%), dry crops (4.4%), and other crops (4.6%). (2) The value of livestock production was NT\$164 billion, accounting for 32.7% of the total value of agricultural production. In terms of the structure of the production value of different types of livestock, hogs was the most important products which accounted for 43.8%, followed by poultry (31.2%), eggs (14.7%), and other types of livestock and their byproducts (10.3%). (3) The value of fishery production was NT\$92.3 billion, accounting for 18.4% of the total value of agricultural production. The production of distant water fisheries accounted for 42.5%, followed by the inland aquaculture industry (35.9%), the offshore fisheries (10.9%), ocean aquaculture (6.8%), the coastal fisheries (3.9%), and the proportion of the inland fish catching was negligible. (4) The total value of forestry production was NT\$240 million, accounting for less than 0.1% of the total value of agricultural production.

Rice is the most important staple food in Taiwan. In recent years, the land planted to rice is about 251,000 hectares, producing about 1.58 million metric tons of rice. The total

production of rice in 2015 exceeded NT\$37.4 billion (COA, 2018a).

### New Agricultural Policies in Taiwan

Agricultural goods account for less than 2% of Taiwan's GDP, with this percentage decreasing from 7.7% in 1981 and 3% in 1996 (Fig. 2). Agriculture is regarded as a weak industry and is reliant on government subsidies to solve many problems. With reference to the statistics on agriculture and the agricultural food chain in Canada, Japan, the UK and the US, traditional production-oriented agriculture has been combined with the concept of the agricultural value chain in the secondary and tertiary sectors of the economy. Since 2013, Taiwan has published satellite accounts on agriculture and the agricultural food chain, providing a complete picture of the economic contribution all industries in the agriculture sector accounted for in Taiwan's GDP (Fig. 3). The share of GDP contributed by agriculture and the agricultural food chain has increased to approximately 6.6% or 7.5%. Before 2010, the agriculture, forestry, fishery, and husbandry industries contributed the most to GDP among all related industries; however, since 2010, the food service industry contributed the most to GDP, followed by agriculture, forestry, fishery, and husbandry industries and food retail (Fig. 4).

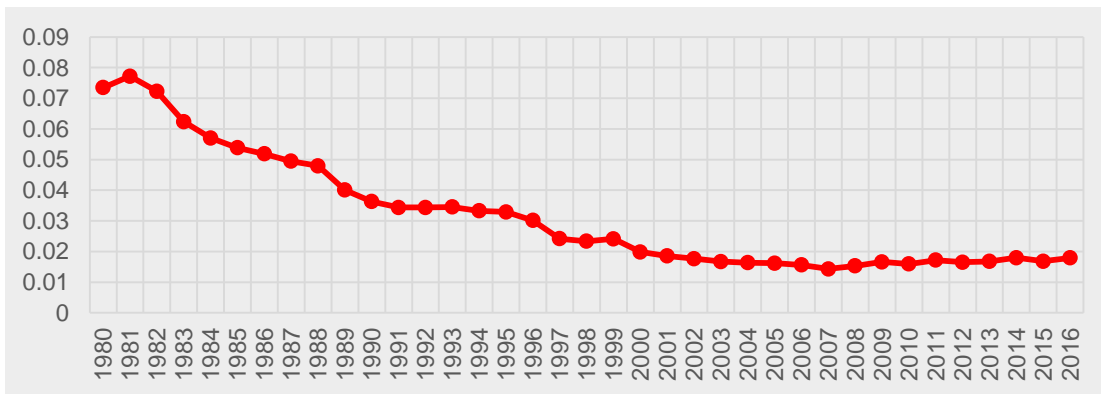


Fig. 2. Contribution of agriculture to Taiwan's GDP

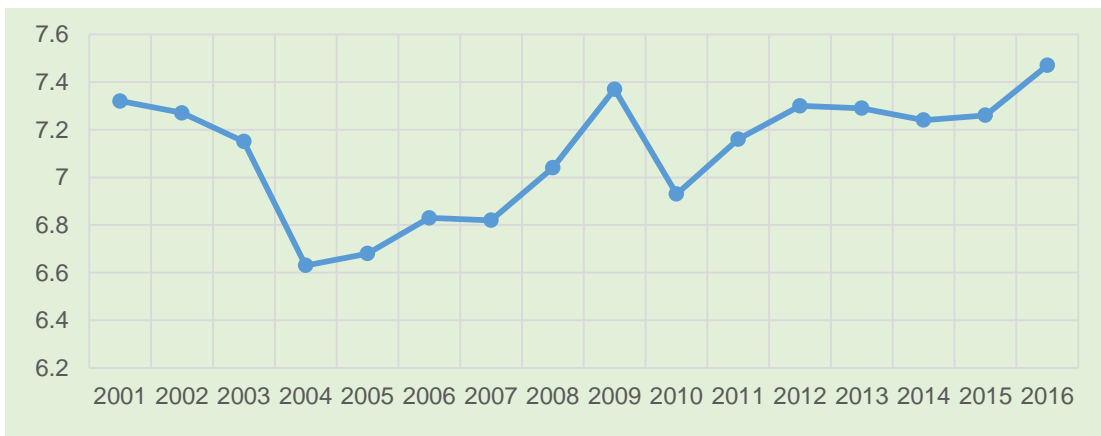
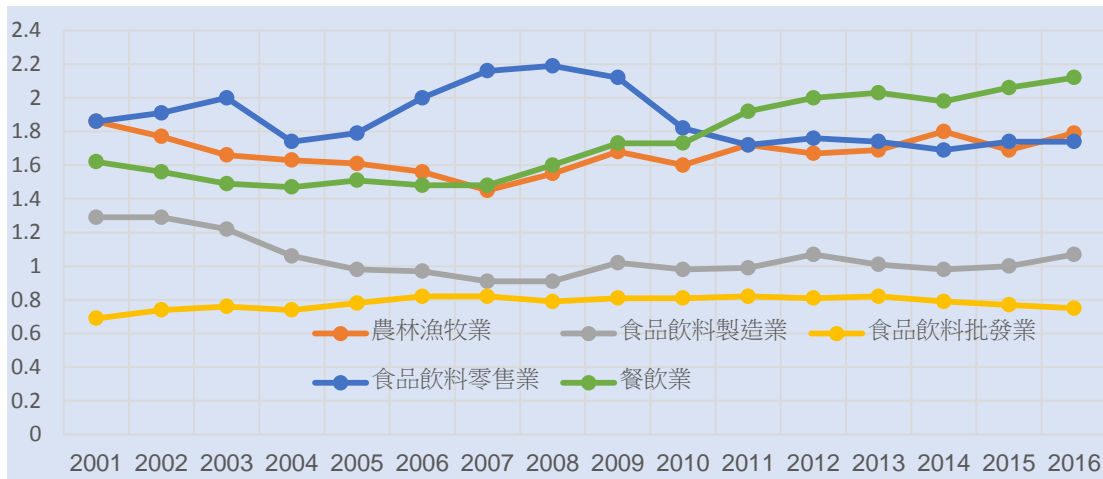


Fig. 3. Contribution of agriculture and the agricultural food chain to Taiwan's GDP



農林漁牧業=Agriculture, forestry, fishery, and husbandry industries

食品飲料製造業=Food and beverages manufacturing industry

食品飲料批發業=Wholesale of food and beverages

食品飲料零售業 Retail of food and beverages

餐飲業=Food service industry

Fig. 4. Contribution of agriculture and each industry in the agricultural food chain to Taiwan's GDP

The core business of Taiwan's agriculture industry has become multifunctional because of the influence of climate change, an increase in food demand, stricter food quality and safety requirements, a global trend in seeking sustainable development, and restrictions in agricultural subsidies following Taiwan's entry into the World Trade Organization (WTO). Taiwan's agriculture industry has shifted its focus from increasing productivity to increasing competitiveness (not including the price-competitive potential). In 1992, the Taiwanese government proposed that agriculture should serve three purposes simultaneously: production; living; and ecology. In 2011, the government proposed the idea of agriculture with multiple values, examining the contribution of agriculture from different aspects—such as that of society (living support), the environment (ecosystem service), and the economy (industry value chain)—and that these aspects should be used to determine the future development of agriculture. The guaranteed-price-purchasing policy has been in effect since 1974. It aimed at increasing agricultural production during the 44 years of its implementation. In term 2 of 2016, Taiwan's Council of Agriculture in Taiwan began a program called direct payment. The trial of this program was expanded in 2017 and the concept of an environmental subsidy was introduced. In 2018, the direct payment program was expanded to a nationwide scale and integrated with policies such as cropland vitalization and support for organic agriculture, with the program renamed the "Farmland-Based Green Environmental Service Payment" program. The purpose of this new program is to encourage farmers to abandon the traditional approach of aiming for higher production and instead focus on the production of high quality rice grain or the implementation of environmentally friendly production methods. This shows that the Taiwanese government's policy direction for agriculture is changing, leaning more toward green and environmental service payments.

Many countries with net agricultural imports actively promote domestic policy reform. This is to actualize measures that facilitate the fulfillment of the multiple functions and values of agriculture, and to ensure room for sustainable development domestically. Another purpose of domestic policy reform is to cope with the restrictions which the WTO imposed on domestic support measures; specifically, subsidies categorized as amber and blue box subsidies, such as price guaranteeing and production subsidies, which were forced to be

abolished. WTO members must transform domestic support measures to green box subsidies, which focus on resource conservation, protection of ecological environment, and food safety. Smallholder farmers in Taiwan struggle to achieve economies of scale in the current agricultural environment and are disadvantaged in price competition, but there is relatively high potential for them to develop multifunctionality in agriculture.

Each agricultural policy that has been implemented in Taiwan since 2016 is detailed in the following according to information published by the Council of Agriculture.

### ***Pilot agricultural insurance program***

Because of drastic changes in the climate and environment brought about by global warming, the intensity and frequency of natural disasters have increased, leading to higher risk in agricultural production. Government budgets and support are no longer sufficient to protect the income and property safety of farmers from damage caused by natural disasters. In 2015, a pilot natural disaster insurance program for agricultural goods was implemented to reduce the agricultural management risk for farmers.

To promote the agricultural insurance program against losses from natural disasters, the Council of Agriculture evaluated which crops would be first covered by the insurance scheme in the early stage of policy planning. Priority was given to Taiwan's main crops that have high economic value and a substantial production area. Researchers have analyzed and classified the crops that can be covered by the agricultural insurance. Through closer examination by agricultural agencies, insurance companies, and agricultural research institutes, 10 crops were selected for inclusion in the pilot program: top-grafted pear; mango; persimmon; Kyoho grape; papaya; tankan; pommel; sugar-apple; java apple; and Asian rice. Local governments suggested the inclusion of 50 other crops, such as tea, green bamboo shoot, banana, and loquat, according to the characteristics of the crops and the needs of farmers in all parts of Taiwan.

Because property-liability insurers lacked professional personnel with an expertise in agriculture, the public sector helped the insurers with the policy's design and disaster claim determination which works during the trial period of the insurance. The top-grafted pear insurance product developed by property-liability insurers passed the review of the insurance bureau of the Financial Supervisory Commission in September 2015 and was put on sale in November 2015. The insurance product for mango became available in November 2016.

In 2017, the Council of Agriculture completed planning and began implementing the insurance for rice grain production, agricultural facilities, and sugar-apple production. The Council will gradually expand the coverage of the insurance and periodically review the pilot insurance program with the aim to design agricultural insurance that is acceptable for farmers and suitable for the current agricultural situation in Taiwan. Through the insurance mechanism, farmers can diversify the risk they face under extreme weather conditions.

### ***New agriculture innovation promotion program***

This is based on the policy blueprint of President Tsai Ing-wen and the principle of innovation, employment, distribution and sustainability. The ultimate goal is to reverse the conservative subsidy policy in the past so that existing resources could be redistributed to strengthen interdisciplinary communication and integration, expedite industry structural transformation, create favorable environment for young talents to return and work in agriculture, in hopes of raising agro-business added value and forging a revolutionary new agriculture through the implementation of three pillars and 10 key policies. The overall objective included increasing food self-sufficiency ratio by 40%, expanding agricultural

output to NT\$219 billion, creating employment opportunities for over 370,000 people, and exporting agricultural product to overseas emerging markets with annual rate of 57%. The three pillars and 10 key policies of new agriculture policy are:

- (1) Establishing new agricultural paradigms: promote green payment on farmland, stabilize farmers' income, improve competition of livestock industry, advocate environment-friendly farming, support sustainable usage of agricultural resources, and develop innovation agriculture;
- (2) Constructing food security and food Safety System: enhance food security and ensure agricultural product safety; and
- (3) Enhancing abilities of agricultural marketing: expand diverse domestic and overseas distribution channels for agricultural products, and increase agricultural added value.

### ***Implement dual system of green environmental payment and guaranteed purchase***

In order to encourage farmers to adopt environmentally-friendly measures for the production of quality paddy, the Council of Agriculture (COA) has implemented preliminary dual system of direct payment policy and guaranteed purchase on rice in 6 townships, since the second crop season in 2016. The declared direct payment area took up 49% of the declared rice cultivation area.

The implementation of direct payment policy expanded to 20 trial areas in the first crop season of 2017, and the declared area accounted for 63% of the declared trial paddy area, which has effectively brought down farmers' dependence on guaranteed purchase. The second crop season of 2017 saw an increase to 50 trial areas with 66% of declared paddy area. The guaranteed purchase system is scheduled to be integrated into the Fallow Land policy in 2018 and adjusted to become the Green Environment Payment for the purpose of encouraging more farmers to produce import-substituted or development-priority crops.

### ***Encourage the use of local fresh ingredients for school lunch and organic and eco-friendly farming***

The Executive Yuan put forward the Five Links of Food Safety Policy to enhance the verification of agricultural products and boost the use of traceable local ingredients for school lunches. In this way, the features of school lunches would be created while food safety policy was implemented step by step. In March 2017, six municipalities, cities and counties namely Hsinchu City/County, Taichung City, Tainan City, Yilan County, and Taichung County were in initial trial. In the same year in September, 20 Cities and Counties including Penghu Counties participated also in the use of 4-labels-1-Q (GAP, CAS, CAS Organic, TAP, and QR Code) ingredients for school lunches, beneficial to 1.86 million students from 3500 schools and boosting 4000 hectares production area. The COA assisted school procurement staff to identify 4-labels-1-Q agricultural products correctly, reinforcing and putting school lunch inspection and ingredients registration into effect.

Organic agriculture and eco-friendly farming is friendly to nature, providing safe and outstanding agricultural product for consumers. In order to promote the development of organic agriculture in the country, organic agriculture technical service groups were formed to hold training on organic agro-business management and counsel the farmers to apply for organic certification and production facilities as well as equipment. Since the initiation of organic and environmentally-friendly cultivation subsidy in 2017, verified organic area has reached 7,541 hectares at the end of November and 13 eco-friendly farming promotion groups have registered 497 hectares of eco-friendly farming area, which is expected to achieve 15,000 hectares in 2020.

### ***Promotion of characteristic leisure farm travel***

Leisure agriculture is an industry that integrates the production of the agriculture, forestry, fishery, and husbandry industries with rural culture and life to provide leisure tourism and experiential learning. It has become a new highlight industry that adds value to traditional agriculture. As of the end of July 2017, 82 agritourism areas were planned in Taiwan. Obtaining improvements in their assessment score over time, these agritourism areas have been classified by levels and types for the purpose of government supervision and support. The ultimate goal is to increase the ability of regional farmers to manage agricultural leisure areas, and to encourage the development of regional themed tourism.

A total of 392 leisure farms have been registered for business and provide opportunities for tourists to learn about agriculture through experiential activities. With government support, 134 sites of rural cuisine were established under the brand of “Rural Mom’s.” These sites provide tourists with authentic local delicacies and snacks. The top 50 sites were selected for marketing promotion. Under government support, local agricultural souvenirs were placed on sale in 15 locations, realizing the goal of local production for local consumption while providing for the convenience of tourists in their in-depth tours. Themed travel based on fruits of the four seasons—namely mango, kumquat, mandarin and longan—was introduced. Various other themed leisure farm activities were offered to promote agricultural tourism, such as the “Five-Star Agricultural Tour in Hualien and Taitung,” “Agricultural Tour in the Mountains and Sea of Yunlin,” “Xinshe Sea of Flowers Festival,” themed tours on food ingredients, and farm tours. In addition, a responsive agricultural tourism information platform was established, including an easy agricultural travel website. The website can be accessed through portable devices and offers interactivity through social media. It is now working on an accessible interface, and there are English and Japanese versions to expand the target customer group. Managers also actively participate in large travel fairs inside and outside Taiwan and are working hard to increase the number of cooperating travel agencies. This is increasing the cooperation between different industries and promoting the physical and digital marketing channels for agricultural travel. For example, cooperation has been established with famous digital channels in Taiwan such as PChome, PayEasy, i-bon, and Fami-port. Package tickets are now available for agriculture travel, which expands the market to group tourists and independent travelers. As of 2016, 25.5 million people had visited leisure agricultural areas, 0.47 million of whom were foreign visitors, and this created NT\$10, 600 million in revenue.

### ***Traceable Agricultural Products (TAP) and Certified Agricultural Standards (CAS) integration***

Traceable agricultural products (TAP) provide certification service for consumers to production process control and product verification, regulating the producers to comply with food safety and sustainable environment standard and certified by international third-party accredited certification bodies. Only those which are certified are entitled to use the TAP mark and open information that allow consumers to purchase at ease.

Four agricultural certification marks that the COA promoted vary in regulations, label design, system content and certification mechanism, making it difficult for consumers to recognize and identify the meaning of the labels. Thus, the integration of the labels came into effect. Taking safety and sustainability into consideration, four agricultural certification marks would be integrated into Organic and TGAP which is combined by the advantages of Good Agriculture Practice (GAP), CAS and TAP. By the end of 2020, an integrated

agricultural product certification system that is reliable, transparent and easy to understand for consumers would be completed. In this way, the promotion producers would stay in line with international standard.

***a. Enhance the participation of international organizations***

In 2016, the COA continued to maintain strong relationships with a number of international agricultural organizations based in Taiwan, including the World Vegetable Center, the Food and Fertilizer Technology Center for the Asian and Pacific Region, and the International Center for Land Policy Studies and Training. We also continued to participate in the Asian Productivity Organization, the Asia-Pacific Association of Agricultural Research Institutions, and the African-Asian Rural Development Organization, and to jointly organize and host international conferences in cooperation with various international organizations.

On the fisheries front, in 2016 the COA continued to participate in annual conferences and relevant working group meetings of a number of major international fisheries management organizations, including the Inter-American Tropical Tuna Commission (IATTC), the Western and Central Pacific Fisheries Commission (WCPFC), the Indian Ocean Tuna Commission (IOTC), the International Commission for the Conservation of Atlantic Tuna (ICCAT), the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), the South Pacific Regional Fisheries Management Organization (SPRFMO), and the North Pacific Fisheries Commission (NPFCC).

In addition, we attended both the 17<sup>th</sup> Meeting of the Conference of the Parties (CoP) of the Convention on International Trade in Endangered Species, and the 13<sup>th</sup> Meeting of the CoP of the Convention on Biodiversity, and the 9<sup>th</sup> meeting of Informal Consultation on International Cooperation for Conservation and Management of Eel Stock. In addition, the COA joined the “4 per 1000 Initiative” as a founding member.

## **GOALS AND CONTENT OF ANNUAL POLICY PLANS IN 2018**

***Create a new agricultural paradigm—developing the characteristics of the industry and cultivating an industrial advantage***

- a) Contribute to the thriving of smallholder farmers; cultivate agricultural enterprises and reform farmers’ production organization; establish a supply system for group production areas; expand the settlement scale of the industry; adjust the structure of the industry; create new agricultural values; cope with the needs of diverse channels; establish a regional processing center for agricultural products; and increase the additive value of agriculture.
- b) Accelerate the industrialization of agricultural technologies; promote bioeconomics and create a market-oriented, highly competitive, and high-value-adding agriculture industry; develop green energy and a circular economy that is energy-saving and low in pollution and emissions; promote automatic and intelligent production; create digital service technology integrated with new-generation production and sales systems; and increase agricultural production and sales.
- c) Promote an upgrade in the livestock industry; increase the pig rearing rate; promote green energy for livestock houses and biogas electric power generation; provide support for the use of domestically produced grain to feed cows; practice modern management for meat; and improve the quality of production, butchering, cutting, and logistics regarding livestock products, thereby increasing the competitiveness of the livestock industry.
- d) Advocate the use of locally grown food ingredients for school lunches, promote food and farming education, and highlight local production for local consumption to vitalize local



economies.

- e) Integrate agricultural training resources to provide support for young farmers; assist during the acquisition of agricultural land and funds; create systematic education courses for farming and places for actual practice, thereby increasing the quality of employees in the agriculture job market; create an agricultural specialist and farming service team, and establish a talent platform for solving the problems of an aging agricultural worker population and a shortage of personnel.
- f) Increase the use of saving functions in agricultural banks; and adjust strategies according to a structure that integrates industry, human resources, and agricultural revenue. This facilitates using agricultural lands in their most suitable scale and leads to improvement of agricultural production efficiency.
- g) Advocate policy loans for agriculture; provide funds needed for agricultural innovation; implement restructuring of the credit department of the National Farmers' Association of Taiwan and strengthen government supervision on this department to reduce nonperforming loans; and continue to operate agriculture credit guarantee fund-based loans to assist farmers and fisherman in obtaining funds for agricultural management.

***Establish new agricultural paradigms—improving ability to cope with climate change and maintaining the sustainability of the ecological environment***

- a) Cultivate and plant agricultural products in the most suitable locations; improve the quality of agricultural, fishery, and livestock product delivery and ensure a stable supply of these products; promote the use of green energy facilities in the agricultural, fishery, and husbandry industries; advocate installing green energy generation facilities on agricultural land to ensure stable income for farmers as well as to increase the green energy produced; promote recycling of agricultural resources; and maintain sustainable development.
- b) Apply big data to plan sustainable ecological group production areas where water, soil, and people are integrated in harmony; and establish agricultural development and production systems with ecological services and climate-adaptive mechanisms.
- c) Improve forest resource management; protect natural forests; promote a long-term monitoring system for forests; promote afforestation; utilize the benefits of carbon absorption by forests; implement reasonable thinning of artificial forests; increase the self-sufficiency ratio of wooded areas and the use of nonwood products; promote ecological travel and natural education in forests; create ecological economics; strengthen the Satoyama initiative; optimize the management of natural reserves; and maintain biodiversity.
- d) Promote maintenance of marine fishery resources; fight against illegal, unreported, and unregulated fishing; strengthen the management of personnel and ships engaged in inshore fishery using real-time monitoring technologies in order to increase marine fishery resources; dredge beaches to slow coastal erosion to maintain the functionality of fishing wharfs; ensure the safety of fishery industry workers at sea; increase the ratio of fishing vessels that have insurance coverage; ensure the stable management and development of the fishery industry; and improve the drainage facilities of aquaculture production areas to increase the disaster prevention ability of this industry.
- e) Promote erosion and sediment control engineering from a holistic perspective; implement more efficient measures for the conservation of the catchment area; adopt integrated governance of river basin management; improve the farm road system and agricultural facilities outside redivided agricultural zones; refine the disaster prevention system for landslides; improve the management and monitoring of hilly areas; create a disaster prevention and relief system for large-scale collapses; reduce the number of large-scale landslides and limit the resultant damage caused by mudflow for water and soil resource

conservation; minimize the damage caused by disasters; and contribute to the goal of reasonably using lands and achieving sustainable land management.

f) Improve the disaster relief and insurance system against agricultural losses incurred by natural disasters; and increase farmers' risk management ability to reduce their losses due to climate change.

***Create new paradigms for agriculture—consolidating diverse energy sources, creating farmlands that are highly livable and workable, and contributing to the formation of a peaceful society with cultivated citizens***

a) Train new farmers to improve the quality of agricultural workers; promote rural village regeneration through community development and construction; encourage the development of characteristic local industries to increase the quality of life in rural villages; refine leisure agricultural tourism services and expand “four seasons”-themed travel; expand the tourism market domestically and internationally; and integrate cultural and creative industries with ecological tourism to revitalize local industries.

b) Cooperate with local government to establish a more comprehensive system for farmers' organizations; assist farmers' organizations to use local resources; integrate rural communities and young farmers to develop innovative businesses in rural areas; improve the service capacity of the industries; and create a six-level industrial value chain.

c) Provide old-age farmer welfare allowance; create a retirement system for farmers; strengthen the social security network; and take care of the living of farmers.

d) Cultivate a sense of responsibility among livestock owners by educating them to respect animals' lives and to take relevant actions; strengthen pet management from the source, specifically by advocating the neutering of pets, and improving the management of animal shelters and the administrative efficiency of pet adoption; and support or establish well-functioning animal protection organizations to strengthen the collaboration between public and private sectors.

***Create an agricultural safety system—improving food security level, improving the traceability of agricultural products, and ensuring food safety***

a) Collect and make available the information on the amount of agricultural land, actual area of crops, and quality; delimit the areas for agricultural development in accordance with the Spatial Planning Act; provide green environment payments; ensure the quantity and quality of agricultural land; and create Agricultural Production and Marketing Specialized Zones to develop agriculture with additive value, enforce the regulation of farmland used only for agricultural purposes, and protect high-quality agricultural production areas.

b) Promote the separation of irrigation and drainage canals to protect the water and soil resources for agricultural purposes, thereby creating a safe environment for the production of agricultural products from the source; improve irrigation constructions on farmlands; improve hardware facilities and operating environments; increase the efficacy of agricultural use of water; develop energy-saving and water-saving new agricultural processes; promote the reasonable planning of agricultural water use; make use of irrigation and water conservancy facilities to satisfy the needs of production, daily life use, and ecology maintenance; and increase disaster prevention and relief ability.

c) Promote the cultivation of organic and environmental friendly crops; promote a compensation mechanism for environmental friendly agriculture; maintain a sustainable environment; replace the guaranteed-price purchase price and fallow land subsidy with green payments; balance the supply and demand of grains; improve quality; and accelerate the

adjustment of the agriculture industry's structure.

d) Improve the effectiveness of agricultural land use; advise farmers on the planting of imported substitutions, key crops, and crops with high potential for export; increase the supply of domestically produced grains; promote a big barn policy of production of nongenetically modified grain crops; reduce the import of grains; and increase the rate of crop import substitution.

e) Integrate the application of and advances in biotechnology and information communication technology to enable the collection of information regarding the crops on farmers' lands; increase agricultural production and efficiency in using resources; promote a plant doctor system and the health management of crops; advise farmers on the reasonable use of fertilizers; reduce the use of chemical pesticides; and maintain environmental sustainability.

f) Improve the quarantine procedures regarding animal and plant disease prevention, including their testing effectiveness; strengthen the implementation of the "One Health" policy; create an epidemic early warning system; establish a fast-track animal disease inspection center; implement pet owner registration and control to prevent or contain the spread of epidemic diseases; assist industries to recover rapidly once a disease has come under control; and prevent zoonoses.

g) Improve testing system for pesticides, heavy metals, and veterinary drug residues of agricultural, fishery, and livestock products before they are put on the market; expand the monitoring and inspection of drugs with high risks and those that are extensively used in the production of agricultural, fishery, and livestock products; improve testing for heavy metal contamination caused by commercial fertilizers and other agricultural materials; improve the effectiveness of hygiene tests of livestock and poultry butchery; improve the transaction environment of the market; and improve the sanitation of agricultural, fishery and livestock products.

h) Promote Taiwan Good Agricultural Practice; increase ability to manage agricultural production safety; integrate and promote a traceability system for Taiwan's agricultural products; increase the efficiency of food safety control; improve the consumption market through trusted agricultural product labels and a certification program; promote alignment with international standards; and seek new business opportunities.

***Improve agricultural marketing capability—strengthening the advantages of the industry and reaching the international market***

a) Introduce large-scale and intelligent production models to selected types of agricultural, fishery, and livestock products with international competitiveness; ensure stable supplies of safe and high-quality agricultural products; develop industries that are advantageous for exports; and increase the export of Taiwan's agricultural products.

b) Cultivate a new generation of agricultural management talent with the abilities of interdisciplinary cooperation and overseas market development, thereby increasing the international competitiveness of the industry in Taiwan.

c) Proactively participate in the economic and trade negotiations of international organizations and in bilateral agricultural consulting; overcome tariff-related and non-tariff-related trade barriers; strive for the entry of Taiwan's agricultural and agricultural-technology-related products onto the international market.

d) Support the healthy development of large agricultural companies; strengthen the marketing of Taiwan's agricultural, forestry, fishery, and husbandry products in international markets; consolidate the country's existing market shares and expand to emerging markets; develop a market-oriented industry of agricultural product exports; create diverse marketing channels; and increase the income of farmers.

- e) Promote international cooperation centered on agricultural technologies and food safety; and strengthen agricultural technical consulting and assistance to increase the chances of exporting agricultural technical assistance.
- f) Advocate for the New Southbound policy; increase exports of southbound agricultural products; contribute to the diversity of the export market; and expand business opportunities worldwide.

***Appropriate allocation of budgets and resources to improve the efficiency of budget execution***

- a) Calculate the annual capital budgeting execution rate of the COA; improve the execution of capital budgeting; and improve the effectiveness of use of capital.
- b) For organizations that estimate their annual expenditures in midterm internal reports, when preparing yearly estimates, consider the ability to implement plans and abide by the principle of zero base budgeting while budgeting for various items in order to appropriately allocate resources.

## **CONCLUSIONS**

The Taiwanese government should draw up a detailed policy plan in response to trade liberalization and thereby ensure the nation's international competitiveness in the agriculture sector and the sustainable development of its related industries. To achieve the goal of sustainable development and international competitiveness, the following policy suggestions are made. First, the governmental management division may plan the introduction of an environmental service payment mechanism for agricultural multifunctionality. The mechanism can classify the environmental quality of agricultural lands and provide payments accordingly. The government should promote the idea that agricultural biodiversity facilitates sustaining ecological balance, establishing among the general public the concept of protecting agricultural biodiversity. Second, national income represents the income level of a country's citizens. National income is used as the main tool for comparing the economic levels of countries. However, national income level only reflects the economic development of a country and does not reflect changes in environmental quality under economic development. If a country pursues economic development at the expense of its environmental resources while another pursues economic development in an environmentally sustainable way, the actual level of quality of the two countries will be considerably different. Specifically, the environmental resource aspect of the development will differ considerably. The present study suggests that Taiwan should moderately adjust its traditional measure of national income to account for the external benefits provided by the environment and seek economic development in a way that is environmentally sustainable. When calculating national green income, not only the positive external benefits brought about by agricultural multifunctionality should be considered, but also the external cost incurred by agricultural production activities. The government should also ensure there is a clear and straightforward method of estimating the value of these activities. The policy of direct payment for grain can be gradually transformed from a two-track system of guaranteed-price purchase pricing and direct payment into a two-track system of fixed payments and variable payments. Furthermore, the government should go further to fulfil the policy goal of green payments based on ecological system service. They should cancel direct payments for rice at an appropriate time, allow flexible registration in the two-track system, and implement a public environmental ecosystem.

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