Research Center for
Soil & Water Resources and Natural Disaster Prevention

水土資源及防災科技研究中

YunTech
國立雲林科技大學
National Yunlin University of Science & Technology

General Information

The Research Center for Soil & Water Resources and Natural Disaster Prevention (SWAN) was officially founded in 2000, after the National Yunlin University of Science and Technology (YunTech) in Taiwan (Republic of China) signed the Cooperation Agreement with the Water Resources Bureau, (predecessor of Water Resources Agency, Ministry of Economic Affairs, WRA). Both SWAN and WRA have been devoted in promoting soil and water conservation and proceed researches, educational awareness and relative prevention works.

The work of SWAN, as well as its achievements, led the WRA in 2004 to sign a permanent Memorandum of Agreement with the SWAN and authorized it to get involved more drastically in projects and works of the local communities and the surrounding areas.
Among other major objectives, the SWAN aims to secure the quality and to promote the tasks and the innovations made in the topical soil and water resources and its environment.

Among other projects, it updates and disseminates disaster prevention awareness and technical knowledge in order to educate and protect the local communities by providing assistance or by managing soil and water resources conservation projects or disaster prevention works, mostly in the counties of Changhua, Yunlin and Chiayi.

The SWAN has established five (5) Departments; Secretary, Administration, Technical Innovation, Education and Public Awareness, and Soil and Water Conservation and one (1) Laboratory; SWAN Lab, in order to develop and proceed multiple projects and works.

The SWAN has managed to receive much positive feedback for its efforts and its contribution in the international research field and in activities all over Taiwan; that is why it has become a national leader in the field of natural resources and hazards.
The SWAN has a very unique culture which distinctly sets it apart as one of the premier research centers in Taiwan and makes it a unique professional partner. It cooperates with universities and other research centers across the globe. It is worth mentioning that the SWAN, after becoming a member of the Asian University Network of Environment and Disaster Management (AUEDM) has participated in various environmental researches, disaster risk reduction studies and hazard management projects with several universities in order to create and apply new strategies and technologies on these matters.

Our Missions and Profile

◆ Local Aspects

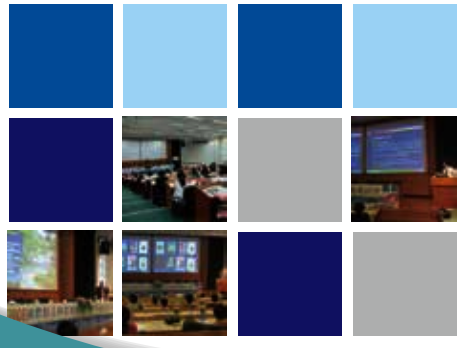
1. Assisting the local governments in planning soil and water resources usage.
2. Assisting the local governments in applying frameworks for natural disaster response and prevention.
3. Assisting the local governments in establishing prevention mechanisms and strategies for natural hazards and man-made disasters.

◆ National Aspects

1. Advising and assisting the central governments in promoting policies for regional and domestic water resources projects.
2. Advising and assisting the authorities of the Chuo-Shui river in establish ing a soil-water resources management system for the Chuo-Shui river alluvial fan.
3. Advising and assisting the central government in adopting and establishing mechanisms and frameworks for plans or projects for nationwide soil/water resources projects and disaster prevention and response.

◆ Global Aspects

1. Being an active member and participating in the soil/water resources conservation and natural disaster prevention activities of the international academic society.
2. Applying the international mechanisms and frameworks for soil and water resources and for disaster prevention and response.
3. Sharing related researches, data and results of the SWAN with countries which are in need of assistance.

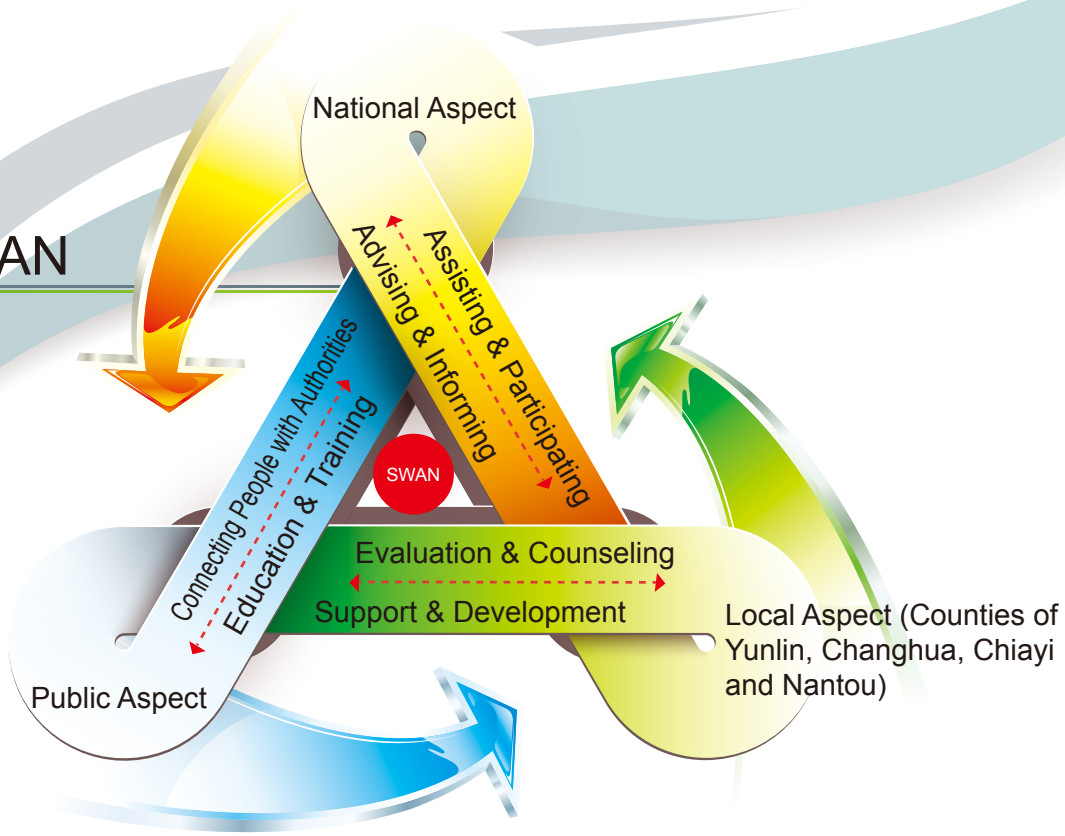




Expertise & Know-how

- ◎ Groundwater Contamination and Transport
- ◎ Groundwater Recharge
- ◎ Soil and groundwater pollution prevention
- ◎ Environmental Evaluation
- ◎ Land Subsidence Prevention
- ◎ Groundwater resource development assessment and analysis
- ◎ Hazard identification, survey and technical support for evidence gathering
- ◎ Assisting local governments in operating, planning and creating strategies and drills in matters of disaster prevention and response
- ◎ Assisting institutes and educational centers of all levels to enhance campaigns of disaster prevention and awareness
- ◎ Disseminating disaster prevention and response matters
- ◎ Assisting and promoting communities focusing in disaster resistance
- ◎ Assisting and facilitating institutes for certification in matters of environmental education
- ◎ Assisting volunteers for flood control and environmental education training schemes
- ◎ Dispatching a counseling team for sustainable and rural regeneration (Collaboration, Contribution, Permanency)

About SWAN



◆ *Ethos of SWAN*

1. Organizational Structure:

1 Director; 1 Executive Secretary and 1 Deputy Executive Secretary;

5 Department Leaders and 5 Vice Leaders; several researchers and experts.

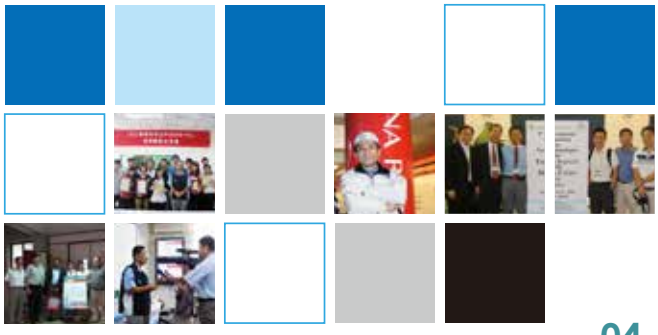
2. Duties and Responsibilities:

A. Director: managing and supervising the operations, formulating the character and the development directions of the SWAN.

B. Executive Secretary and Deputy Executive Secretary: Providing professional and technical expertise, project planning and workflow.

C. Department Leaders and Vice Leaders: Planning and managing the implementation of works and projects, supervising the work progress, administrative matters, technological researches, policy and promotion of works and projects.

D. Researchers: Executing, performing, reporting and composing projects and works.



◆ Land Subsidence Prevention and Recovery

The SWAN is responsible for works related to land subsidence; some of them include the investigation of seawater intrusion, surveys for land subsidence factors, inventory of wells, land subsidence trends along the High Speed Rail (HSR), groundwater recharge mechanisms and promotion, etc. Results and descriptions of works and projects as follows:

◎ Investigation results of the groundwater recharge mechanisms:

1. Analysis of the traditional hydrogeological parameters obtained by in-situ tests (Zhutang) and accuracy comparisons of the hydraulic conductivity, as reference for the evaluations of the groundwater recharge mechanisms.
2. Producing mechanisms for groundwater recharge based on on-site tests and evaluations for water quantity by using groundwater recharge shafts for the feasibility of the groundwater conservation.

◎ Outcomes of groundwater recharge works:

The SWAN has completed the first large-scale groundwater recharge facility in Taiwan,

1. also known as the “Chou-Shui river groundwater recharge facilities”. For the counties of Changhua and Yunlin, the SWAN suggested that by building a dam on the Shia-Shou-Pu reach, an artificial lake at the apex of the Chou-Shui alluvial fan and a storage facility on the northern bank of the Chou-Shui river floodplain, the groundwater recharge volume of the Chou-Shui river alluvial fan can be increased and the effects of land subsidence can be reduced. For its innovative development and effective groundwater recharge results, this work can be used as a reference for future related works in Taiwan or in other counties.
2. For the groundwater recharge performance of the flood prone areas in the Chou-Shui river alluvial fan, the SWAN has completed a research, based on a 10-year rainfall data project and on actual rainfall data (2000-2014). The SWAN is also responsible for reports regarding the volume estimations, evaluations and results of the groundwater recharge in the counties of Yunlin and Changhua which can be used as a reference for related projects of the central government.

◆ Allocation of Regional Water Resources

The SWAN is responsible for works related to the allocation of regional water resources; some of them include the construction and maintenance of the Douliu Canal water distribution model, the construction and maintenance of Cizipi Canal irrigation model, feasibility analysis for the Cho-Suei irrigation system, feasibility planning for the Gukeng artificial lake, investigation and development planning for the groundwater resources in Minzu Basin and the irrigation system of Yunlin, development planning and management of the water resources in Formosa Plastics Group (FPG) Naphtha Cracker #6 Industrial Park, land subsidence prevention works for the Chou-Shui river alluvial fan, etc. Results and descriptions of works and projects as follows:

◎ Outcomes of the Douliu Canal water distribution model:

For the water volume consumption analysis of the Douliu Canal, the SWAN applied water balance methods as well as the agricultural concept of saving water during the nighttime off-peak hours.

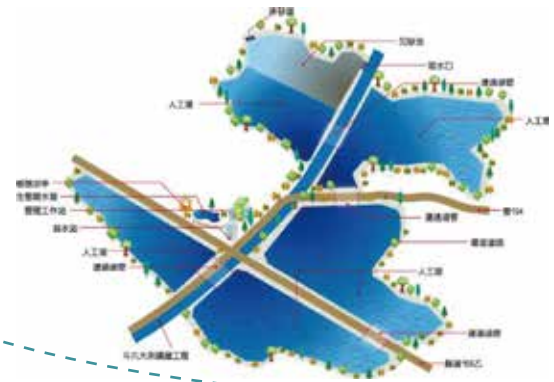
The results showed that 2,772 Megatons of water can be saved annually. Moreover, 2,197 Megatons of water to be saved by reducing the pumped water usage by 757 Megatons. This quantity is enough to supply all the drought areas of Yunlin through the Douliu Canal irrigation system.

◎ Outcomes of the feasibility plan for the Gukeng artificial lake:

The SWAN was responsible for the research development, the construction and the work processes of the Gukeng artificial lake. The management and all the operations were planned based on the “Research and Recommendations for Reservoir Management: Human Resources, Operations and Maintenance” framework.

◎ Investigation and development planning for the groundwater resources in Minzu Basin:

In order to confirm the adequate volume of the groundwater resources and the potential for further development of the Minzu Basin, the SWAN investigated all the necessary data (hydrogeological, river flow, groundwater level data, etc.) as well as the data obtained from the in-situ tests for analysis and simulation. The results showed that the development of an underground reservoir in the Minzu Basin is feasible.



Actions and Contribution

Department of Technical Innovation

◎ Investigation and development planning for the irrigation system of Yunlin:

By assisting the Yunlin Irrigation Association, the SWAN investigated the irrigation and water supply system in comparison to the demand statuses. Among other fields, emphasis was given to the irrigation sources, hydrological data, agricultural demands, etc.

The results of this research contributed in the establishment of a water saving irrigation database for the agricultural demands of Yunlin and in a comprehensive analysis for an efficient and effective irrigation system based on the fair demands and needs of the consumers. Furthermore, the outcomes suggest methods for minimizing the irrational water consumption and adapting a sustainable agricultural scheme for the county of Yunlin.

◎ Formosa Plastics Group (FPG) Naphtha Cracker #6 Industrial Park:

By completing this project, the SWAN provided solutions to the water supply and demand problems which exist for more than 50 years in the Chou-Shui river alluvial fan. The research focused on the relationship between the water consumption for industrial use in the Naphtha Cracker #6 Industrial Park, the causes of the water shortage phenomena in certain areas of Yunlin and the water consumption by groundwater pumping. The reports presented the actual water consumption of each factor as well as methods for a more efficient water consumption policy.

◆ Aerial Photography and Videography

The SWAN uses unmanned aerial vehicles (UAV) for aerial photography and videography, mostly for research purposes related to the Hushan Reservoir, the Chou-Shui river recharge facilities, the detection and management of the pollution in Qingshui village (Lugu Township), land sliding phenomena, etc. Additionally, the UAV can assist further investigation and evaluation reports for the environmental differences and impacts during and after the development of large scale projects as well as potential disaster impacts. Results and descriptions of works and projects as follows:

◎ Chou-Shui river groundwater recharge facilities:

The SWAN uses UAV in order to inspect the status of the Chou-Shui river groundwater recharge facilities and detect possible damages of the embankments.

◎ Investigation of hyporheic flow in Xi-Luo section of the Chou-Shui river:

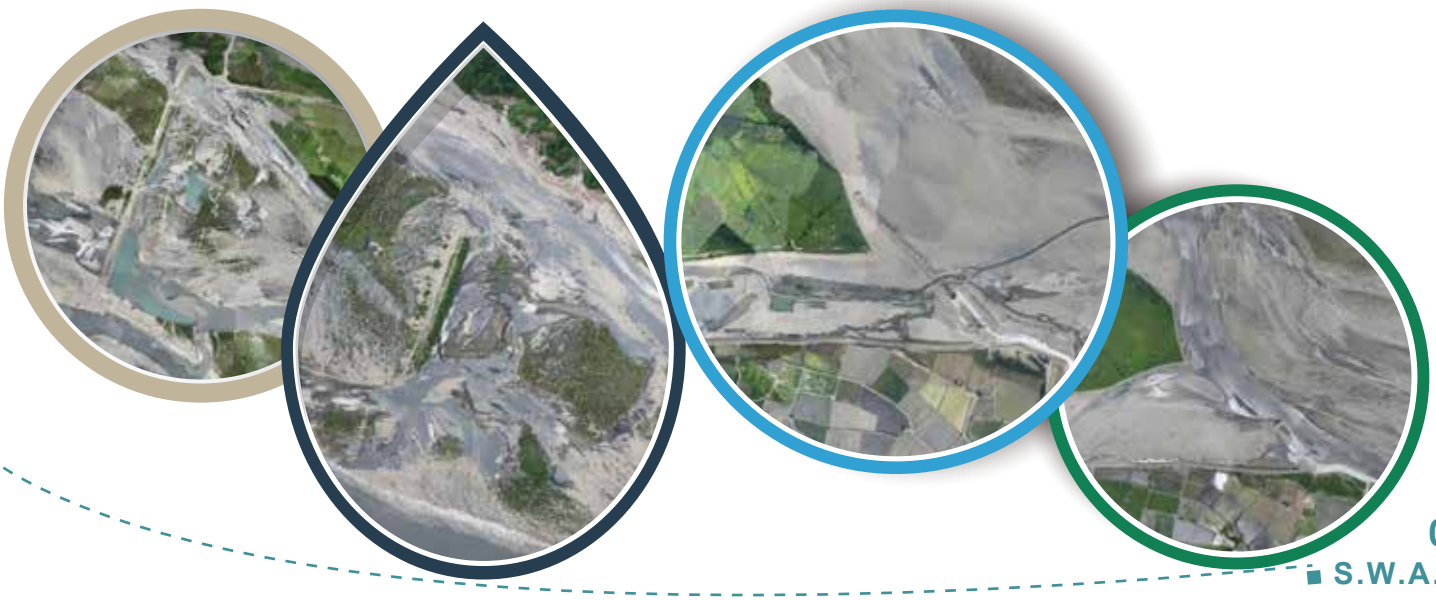
By using UAV, the researchers of SWAN can estimate all the necessary parameters, such as the groundwater flow, the distance between the observation well and the watercourse, the length of the wet perimeter, etc. more accurately.

◎ Detection and management of the pollution in Qingshui village (Lugu Township):

By assisting the Nantou County Government, Environmental Protection Bureau, the SWAN has completed a project related to soil and groundwater monitoring in order to identify all the potential sources of pollution in the Qingshui village. Furthermore, the project records and allocates all the crop species and the agricultural activities in order to detect the exact location of the pollution source. For more accurate results, the UAV was used to observe the area.

◎ Land sliding phenomena:

The SWAN uses the UAV in order to investigate and evaluate the impacts of the land sliding as well as the environmental changes and impacts of influenced areas.



◆ Investigation and Development Planning of Water Resources

The SWAN is responsible for works related to water resources; some of them include hydrogeological surveys for all the groundwater regions of Taiwan, issuing handbooks and manuals for the investigation and the analysis of the available groundwater volume in Taiwan, the investigation and the analysis of the hyporheic flow in Taiwan, a comprehensive scheme for the investigation and the analysis of the available groundwater volume in Taiwan, etc. Researches as such, are pioneering in the fields of water resources and water survey planning and can be used as an important reference or guide not just in Taiwan but worldwide. Results and descriptions of works and projects as follows:

◎ Hydrogeological surveys for all the groundwater regions of Taiwan:

For a comprehensive and detailed research regarding the hydrogeological surveys for all the groundwater regions of Taiwan, the SWAN has collected, investigated and analyzed vital data such as geology and terrain data, hydrogeological data, parameters of aquifers, groundwater recharge volume and location data, groundwater level changes and trends, water quality data, etc.

◎ Handbooks and manuals for the investigation and the analysis of the available groundwater volume in Taiwan:

In order to complete this research, the SWAN investigated both domestic and foreign references so to collect and analyze all the information which can be used as a basis for this issue. This research was planned and composed based on the “Reference Manual for Investigation Analysis of the Available Groundwater Volume in Taiwan-(draft)”.

◎ Handbooks and manuals for the investigation and the analysis of the hyporheic flow in Taiwan:

In order to complete this research, the SWAN investigated both domestic and foreign references so to collect and analyze all the information which can be used as a basis for this issue. This research was planned and composed based on the “Reference Manual for Investigation Analysis of the Available Hyporheic Flow in Taiwan(draft)”.

◎ Comprehensive scheme for the investigation and the analysis of the available groundwater volume in Taiwan:

The lack of behavioral data for groundwater pumping and groundwater recharge, as well as non-accurate analysis for the available groundwater volumes lead to difficulties and obstacles for promoting effective groundwater management practices and strategies for the conjunctive utilization of surface water and groundwater. Therefore, the SWAN has created a comprehensive scheme after advising the” Investigation Analysis Scheme for the Available Groundwater Volume in Taiwan (draft) ”.

◆ Investigation and Development Planning of Water Resources in Case of Emergency

The SWAN is also responsible for works related to water resources in cases of emergency; some of them include the testing processes of Kuaiguan and Chutang water treatment plants, investigations and evaluations of the on-site observations for hyporheic flow in Xi-Luo section of Chou-Shui river. This research aims to provide all the necessary assistance and guidance to the government in order to adopt, plan and develop water resource policy for all the cases of emergency (e.g. extensive drought). Results and descriptions of works and projects as follows:

◎ Outcomes of the Kuaiguan water treatment plant:

For this project, both field and empirical data were analyzed in order to build and verify a numerical model and to detect 15 potential locations for optimal well installations.

◎ Outcomes of the Chutang water treatment plant:

The SWAN has assisted the Eleventh Branch of Taiwan Water Corporation to plan and develop a water intake facility, based on subsurface flow, on the northern shore of the Chou-Shui river floodplain near the lower and upper streams of Zichian Bridge. The numerical model simulation built for this project was able to detect the most optimal solution for a radial collector well.

◎ Investigations and evaluations of the on-site observations for hyporheic flow in Xi-Luo section of Chou-Shui river:

For this project, related methods have been investigated in order to estimate the relationship between the surface water and groundwater in Xi-Luo section of Chou-Shui river. The results showed that the surface water and the groundwater exchange capacities appear to have similar values (0.12~0.29cms); fact which proves the representative of the hyporheic flow. Additionally, the results showed the outflow of hyporheic flow comes from the south bank, therefore all the development works were suggested to be planned accordingly.

Actions and Contribution

Department of Technical Innovation

◆ Environmental Monitoring and Research

The SWAN is responsible for works related to environmental monitoring and research. The “Hushan Reservoir Project: Downstream River of Tongtou Weir Hydrological and Environmental Monitoring” is one of them. Results and description of this work as follows:

This project focuses on the downstream rivers of Tongtou Weir; more specifically the Chinshui river and the Chou-Shui river. The simulation analysis and the influence estimations of the Tongtou Weir before and after the construction of the Tongtou Weir were based on hydrogeological data, river flow data, groundwater levels, air quality, etc., as well as related investigations and trials from the on-site hydrogeological data. This project aims to evaluate the environmental impacts of the Chinshui and Chou-Shui rivers.

◆ Pollution Investigation and Prevention

The SWAN is responsible for works related to pollution, both for investigation and prevention; some of them include the water quality evaluation and analysis of hydrological stations, soil and groundwater pollution prevention in Nantou county, soil and groundwater pollution investigations along the river Erhjen, innovations for water quality, pollution investigation and prevention for the Shin-Hu-Hwei River, etc. Results and descriptions of works and projects as follows:

◎ Outcomes of the soil and groundwater pollution prevention in Nantou county:

Since 2002, the SWAN investigates the soil and groundwater pollution and promotes related prevention strategies in Nantou County. It is estimated that more than 20 monitoring wells have been installed and according to the annual monitoring data, the water quality concentrations of the wells located in Nantou city, Lugu township, and Mingjian township have been improved. Furthermore, the soil and groundwater monitoring network in Nantou county has been upgraded and improved after establishing this long-term project.

◎ Outcomes of the soil and groundwater pollution investigations along the river Erhjen:

For this project, the SWAN assisted the Environmental Protection Administration (EPA), Executive Yuan to complete soil and groundwater pollution investigations along the river Erhjen (Tainan county). Based on the research results, the interviews with the local communities and the field samples it was found that the soil and groundwater pollution levels of 11 sites were higher than the acceptable limits; 2 of them were even found to have extremely high pollution levels. After the completion of this research and the results provided by the SWAN, the local government was advised to act drastically and decrease the pollution levels of 6 sites along the river Erhjen so to manage this issue.

◆ Resolving Public Nuisance Disputes for Pollution Matters

The SWAN is responsible for works related to public nuisance disputes. Such services are provided since 2008 till present. In most cases, the SWAN provides assistance to EPA; some of the responsibilities include the issuing of handbooks and manuals such as the “Managing Public Nuisance Disputes and Evaluation References for the Environmental Protection Officers” and the “Standard Operation Procedures for Public Nuisance Disputes in Case of Emergency”, updating the administrative information system (AIS) of the EPA public nuisance disputes, holding workshops and conferences for identifying and managing public nuisance disputes, etc. The goal of projects as such is to provide information and know-how to all those involved with the environment in order to boost their potential in matters of public nuisance identification and evidence collection and to reduce such phenomena.

◆ Strengthening Disaster Prevention Potential of Central and Local Governments

◎ Investigation results of the groundwater recharge mechanisms:

1. The SWAN, as an academic research institution related to disaster prevention, provides assistance and academic research to the central government and the Ministry of Science and Technology for all the related matters in Yunlin county. Additionally, it connects both central and local governments in order to exchange information more efficiently.
2. Besides Yunlin county, the SWAN provides assistance for disaster prevention to the local governments of Changhua county and Chiayi city to promote the effectiveness of the regional research and operational support, to upgrade overall research and development potential, and to provide technical support for matters related to disasters. The SWAN is also responsible for disaster prevention education and training drills. Such drills mostly include disaster prevention, mitigation and preparedness information and techniques combined with practices.
3. The SWAN provides research and projects for environmental investigation when disasters occur (e.g. landslide investigation - Morakot Typhoon in 2009, flood investigation projects after the appearance of typhoons, etc.). Moreover, the SWAN has created a disaster-prone index database for flood and landslide phenomena, based on the data of the areas of Yunlin and Chiayi.

◎ Promoting Disaster Prevention Works and Education

The SWAN holds or participates in domestic and international activities and conferences for promoting disaster prevention matters. The goal of such actions is for experts to share their ideas and knowledge with the public and spread disaster prevention awareness.

The SWAN organizes competitions and activity programs for disaster prevention. Most of them include singing, picture books, blogs, etc., especially when they are referring to children in order to raise citizens' interest.

Since 2015, the SWAN participates in all the phases of the Sendai Campaign, UNISDR. This campaign bridges the gap between civil societies and world leaders; giving power to the local communities' voice.

The SWAN supports this campaign by providing services and assistance when needed, by representing the local communities of Taiwan and my promoting the campaign. Additional information related to SWAN's contribution in this campaign can be found on the official website of the Sendai Campaign.

Counseling Educational Institutes of All Levels to Promote Disaster Prevention Awareness

The Ministry of Education has authorized the SWAN to hold counseling groups for assisting schools and other educational institutes all over Taiwan to promote disaster prevention awareness. Disaster prevention plans for schools, environmental investigations and hazard maps are just few of the tasks of these groups.

Promoting Disaster Prevention for Local Communities

By assisting the local governments of Yunlin and Changhua counties and Chiayi City, the SWAN aims to provide the communities all the necessary tools and information for disaster prevention matters, including counseling, disaster prevention planning, environmental investigation, as well as training. The goal of such projects is to make people aware of disaster prevention and self-protection in order to minimize the impacts and reduce the casualties when disasters occur.

Identifying Environmental Education Facilities and Fields

According to the Environmental Education Act, the SWAN provides assistance to institutions which need to identify specific spaces as their environmental education facilities. The SWAN has assisted the Yunlin Irrigation Association to identify its museum of irritation as an environmental education facility. Regarding the fields, the SWAN has organized various environmental education activities and programs for promotion. The goal of such projects is to make people aware of environmental education.

Training Volunteers and Personnel

The SWAN assists institutions in matters of personnel/volunteer training, mostly for flood awareness and environmental education matters so the services of the volunteers to become more efficient. For instance, the SWAN provided flood prevention training programs to the volunteers and personnel of the Fourth River Management Office, WRA and environmental education training programs to the volunteers and personnel of Yunlin Irrigation Association. Volunteering is important for society and the SWAN hopes through such training programs to make more people participate in public affairs and disaster prevention campaigns or other related environmental and educational issues.

Actions and Contribution

◆ *Reformation of Rural Communities Based on Sustainability and Smart City Concepts*

The SWAN assists the local governments in innovative and development plans for the reformation of rural communities. Based on “Smart City” concepts, the SWAN provides research and complete works which can boost the potential of the local people and their territory.

Additionally, the SWAN provides counseling, guidance, development projects, training, assistance with the local governments and authorities, as well as innovative ideas for reforming areas and improving the life of the people. By creating projects which improve the life quality, and focus on the financial and social potential of the local environment, the SWAN hopes these communities to maintain their character, to remain healthy and to continue to develop and prevent the young generations from moving to bigger cities.

Collaborations and Partnerships

Member of the Asian University Network of Environment and Disaster Risk Management (AUEDM). The aim of AUEDM is to find solutions to matters related to climate change and disaster management.

Member of the AXA Research Fund. The AXA Research Fund was created to encourage scientific research that would contribute to understanding and preventing environmental, life, and socio-economic risks.

Member HORIZON 2020: The EU Framework Programme for Research and Innovation. The Yuntech is an official Institutional Contact Point (ICP) in Taiwan.

Member of ERASMUS+, as well as member of other European Programmes.

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◆ *International Partners*

1. Kyoto University. Both parties cooperate in research activities, projects, exchange knowledge and personnel and try to find solutions to disaster management and disaster risk matters.
2. Department of Hydrology and Water Resources of the University of Arizona. Prof. T.-C. Jimmy Yeh of the University of Arizona has been named as one of the main advisors of SWAN for matters related to hydrogeological heterogeneous measurements, studies and projects.
3. Sichuan University for matters of hydrology.
4. China Institute of Water Resources and Hydropower Research (IWHR) for matters of hydrology.
5. Municipality of Volvi (Greece) in research activities, projects, exchange knowledge and personnel.

◆ *Domestic Partners*

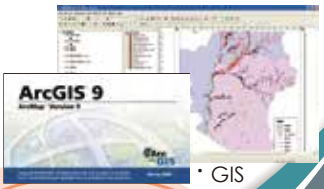
1. International Affairs Office, National Applied Research Laboratories National Science and Technology.
2. National Science and Technology Center for Disaster Reduction (NCDR).
3. Taiwan Agricultural Research Institute (TARI).



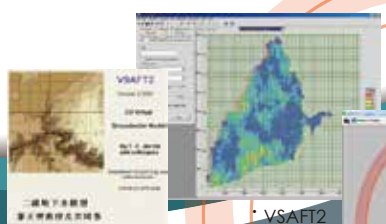
Capabilities

- Hydraulic tomography
- Signal spectrum analysis
- Quantity evaluation of groundwater recharge
- Quantity evaluation of pumping well by electricity consumption
- Modeling the stage of groundwater (MODFLOW)
- Hydrologic and hydraulic analysis (HEC-RAS model software)
- Evaluation of the available groundwater quantity by water-table fluctuation
- Cross-section measurement and structural survey of riverbed
- Numerical Model for topography measurement
- Control Survey
- Geographic Information System (GIS)
- Water quality analysis (Aq.QA.)
- Evaluation of the groundwater resources using geophysical techniques.
- Simulation and evaluation of the impacts caused by earthquakes with the usage of Taiwan Earthquake Loss Estimation System (TELES)
- Modeling the disaster of toxic chemicals and planning warning areas (ALOHA)
- Planning potential emergency evacuation routes and shelters by inundation potential maps
- Analyzing and superposing protective objects in an influence area of potential debris flow torrent
- Disaster prevention maps (ArcGIS)
- Disaster survey and site investigation by using GPS and laser rangefinder

・GMS



・GIS


・VSAFT2

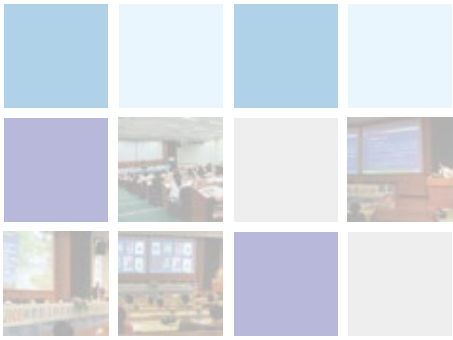

・eMotion 2

Equipment

- Real-time Kinematic (RTK) GPS
- Pressure Water Level Gauge
- Full depth suspended load sampler
- Spectroquant
- High accuracy electronic level instruments
- Recording Water Level Gauge
- Satellite navigation system
- Satellite positioning system
- Submersible motor pump
- Ultrasonic tester
- Højtydende total station
- Metal Detector
- Air Respirator
- Position Transmitter
- Laser total station
- Frequency inverter and underground pumping equipment
- e-GNSS
- Aerial System
- Stalker Pro II
- LEICA GEO Office For GPS
- Doppler-StreamPro ADCP
- Radar Sensor Station





Objectives and Goals

1. Further collaboration and association with industries, governments and academia in order to improve the technology of soil and water resources and disaster prevention.
2. Advising and assisting local governments in soil and water resources and disaster prevention related issues and matters.
3. Cooperating with other institutes and research centers to integrate and exchange both academic and technological information.
4. Improving the water quality in the counties of Yunlin, Changhua, Chiayi and Nantou and minimizing the coastal subsidence problems in Chuo-Shui river alluvial fan.
5. Creating and establishing disaster prevention and response mechanisms for both local and central governments, reducing the casualties caused by natural disasters.

Map and Directions

◆ How to find us

◆ Join SWAN

The SWAN is always willing to expand its national/international network. If you are interested in working with us or collaborating in research programs, exchange programs and workshops or academic journals feel free to contact.

Contact Us

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