The possible influence of climate variability and fishing activity on the annual fishing conditions of Grey mullet *(Mugil cephalus* L.) in the Taiwan Strait

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The Grey mullet (*Mugil cephalus* L.) is a cosmopolitan species that is distributed in tropical and temperate zones at latitudes 42˚N–42˚S (Thomson 1963). It is one of the most important commercial species of fish in the coastal fisheries of Taiwan. A cohort analysis was performed to estimate the population number and instantaneous rate of fishing mortality by age of Grey mullet in the Taiwan Strait (TS) in 1958–2004. Since 1986, annual catches considerably dropped and continually remained at an extremely low level during the period despite the high fishing intensity. The population number of Grey mullet aged > 4 y has declined since 1986 and decreased to 20 000 individuals in 2004, constituting only 0.01% of the maximum level in 1981. The Grey mullet stock probably lost the reproductive potential because of severe recruitment overfishing since 1960s. Overexploitation of the Grey mullet stock reduced its spawning biomass to age 3–4-y groups, and environmental changes during the past 2 decades have likely driven the stock to consecutive years of poor recruitment and its current low level in the TS. Based on a long-term variability of sea surface temperature (SST) in the TS, it implied that variations of SST in winter caused by climate variability and climate change have a major role in affecting the abundance and migration behavior of Grey mullet in the TS.
The long-term unique long-term (1967–2009) records of catch per unit effort (CPUE) of Grey mullet in the TS was further used to investigate the influences of multi-timescale climatic indices on the annual catch of grey mullet. The CPUE of Grey mullet showed fairly good correspondence with the annual PDO index (R^2 =0.82, $p<0.01$). The PDO may play a role in affecting the migration of grey mullet, but increases in SSTs may be a main reason for the decreased catches after 1980.
This study is to estimate exploitable biomass and recruitment of grey mullet stock in the Taiwan Strait. Cohort analysis was employed to estimate population number and the instantaneous rate of fishing mortality (F) by age for 1958-2004. The population number of grey mullet in the Taiwan Strait decreased from late 1960s to early 1970s due to the high instantaneous rates of fishing mortality in 1960s. Since 1986, annual catches sharply dropped and continuously remained at a very low level these years despite of the high fishing intensity, which indicates that overfishing has existed since 1960s. The population number of age group over age 4 has decreased since 1986 and reduced to be 20 thousand individuals in 2004, which is only 1/100 of the maximum level of 2 million individuals in 1981. It seems that the grey mullet stock has lost the reproductive ability due to the severe recruitment overfishing.

Keywords: Grey mullet, Climate change, Pacific Decadal Oscillation, Cohort analysis, Wavelet analysis

Simulated Impacts of Afforestation in East China on Climate Modulated by Ocean Variability

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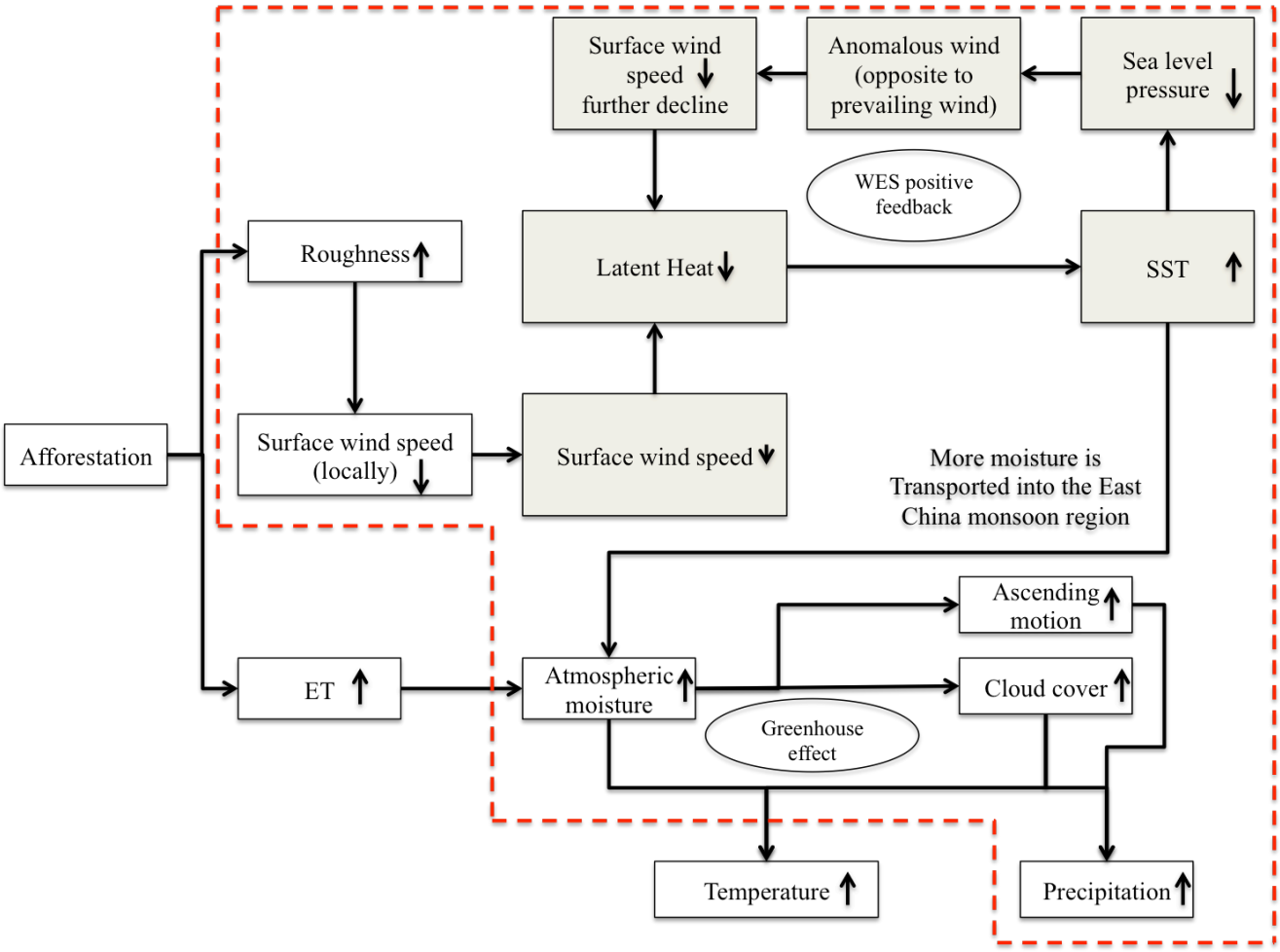
Using the fully coupled climate model, NCAR CCSM3.5-DGVM, this work examines the effects of afforestation in East China on climate and the role of ocean variability in modulating with these land-atmosphere interactions.

In response to afforestation, the local surface air temperature significantly decreases in summer and increases in winter. The summer cooling is due to enhanced evapotranspiration. The winter warming is caused by a decrease in surface albedo, and in the presence of ocean variability, this warming is enhanced by the trapping of longwave radiation by additional moisture and clouds.

With the ocean variability, the response of the hydrologic cycle to afforestation is amplified. More water vapor transport in East China and form more cloud and precipitation especially in winter and pre-monsoon season.

Keywords: Afforestation, Ocean variability, WES feedback



Ecological risk assessment of island exploitation based on relative risk model

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Keywords: Island, Risk Assessment, Relative Risk Model, Human Exploitation Activity

A comparison of individual exposure, perception, and acceptable levels of $PM_{2.5}$ with air pollution policy objectives in China

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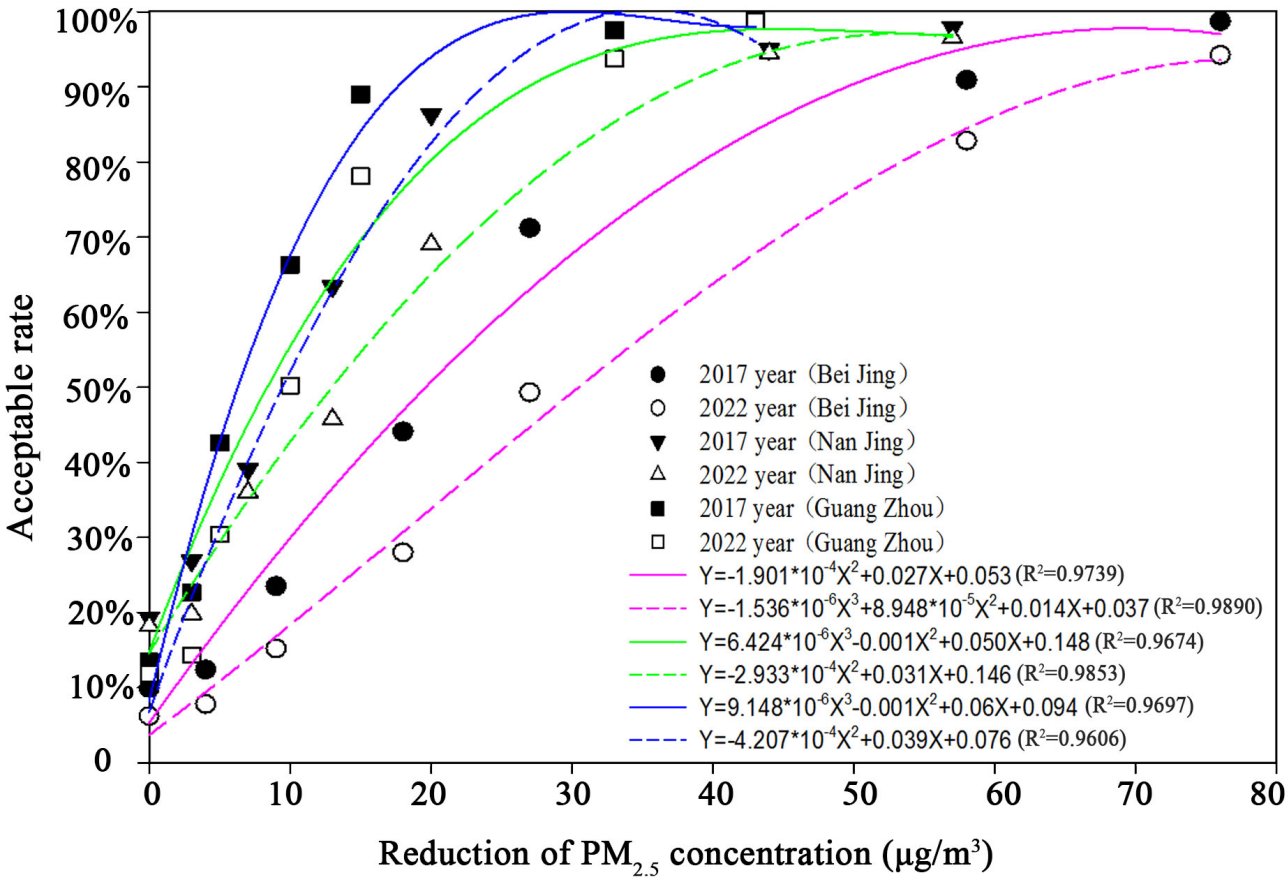
In order to explore the public perception of air pollution andevaluate what constitutes public acceptable concentrations of fine particulate matter (PM2.5), questionnaire surveys were conducted separately in three representative cities, Beijing, Nanjing, and Guangzhou in China.The multi-city results demonstrated great differencesin public risk perception.The public perception of the health effects of air pollution (*Effect*) and familiarity with it (*Familiarity*) were significantly higher in the winter than in the summer. Moreover *Effect* and *Familiarity* during severe haze dayswere significantly higher than during typical days.The public perception of trust in the government (*Trust*) was consistent regardless of seasonal and weather conditions. Exposure to severe haze pollution and experiencing harms from it were key factors influencing public willingness to take action in response to haze.These results implied that individual levels of exposure correlate quite closely with risk perception and acceptance of PM2.5. However, there remains a crucial gap between public acceptable risk levels (PARL) of air pollution and the policy objectives of the Action Planon Prevention and Control of Air Pollution. Thus, the results of this study may act as a strong reference for policymakers to develop more effective measures to combat air pollution.

Keywords: Air pollution, Risk perception, PM2.5 exposure, Preventative action, Environment Management



Integrating remote sensing and in-situ data to delineate vulnerable groundwater recharge areas in urban cities of Taiwan

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Stream sediments are transported from mountainous regions to lower terrains before their deposition in the coastal alluvial plains. Since stream gradient and potential groundwater recharge are relatively high in upper stream of alluvial systems, it is critical to develop conservation policies to delineate and protect the vulnerable groundwater recharge areas (VGRAs) for sustainable management of surface and groundwater resources. Even though VGRAs are relatively small in Taiwan, human activities have gradually spread over the VGRAs as a result of urbanization. To address the critical issues about VGRAs linking to urbanization, three cities in the western plains of Taiwan are chosen, including Taichung, Jiayi, and Tainan cities, as study areas. This study integrates remote sensing data and in-situ geologic drilling to delineate the VGRAs in both regional and local scales. Drilled hydrogeological frameworks are implemented with auxiliary soil moisture and land cover derived from MODIS and Landsat images as indicators. Preliminary results show that in-situ groundwater quality and quantity data in delineated VGRAs conform the characteristic of groundwater recharge. Findings of this study provide a possible solution to protect the human-natural system in developing urban and alluvial plains.

Keywords: vulnerable groundwater recharge, geologic drilling, soil moisture, land cover

Application of Ecological Suitability Assessment Method in Functional Zoning, Protection and Utilization Planning of Uninhabited Islands

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This paper introduced the ecological suitability assessment method, originally from land use research, into the functional zoning, protection and utilization planning of uninhabited islands. This study established the ecological suitability evaluation index system, using Danmenshan Island as an example. Based on the index system and its calculation results, a map overlapping operation was conducted using GIS software, in order to set up a quantitative method for the land use of Danmenshan Island. This quantitative method, which introduced the ecological suitability assessment concepts, could be transfer to other uninhabited islands, assisting their decision-making and planning strategies.

Keywords: ecological suitability, functional zoning, uninhabited islands

Comparison of sap flux density of a tree and a palm species and their responses to changing urban environments

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Urban greening strategy has been proposed to mitigate air pollution and provide significant ecosystem services. One method to assist in planning strategies for water management in an urban setting is to study tree water use and its response to environments of different tree species. We measured sap flux density (J_s) of a tree (*Tabebuia argentea*) and a palm (*Ptychosperma macarthurii*) species in a roof garden by using Granier' s thermal dissipation method. The daytime and nighttime J_s were analyzed under rain-free and rainy conditions. The results showed that with high vapor pressure deficits (*VPD*), diurnal pattern of J_s in palms was higher than that in trees . In addition, in both rain-free and rainy conditions, palms have faster response of daytime J_s to *VPD* as compared to trees, suggesting their more sensitivity to changes in the evaporative demands. At night, trees and palms have no response to *VPD*, yet the nighttime fluxes were significant, ranging 18-23% and 20-25% of the daily sum J_s in trees and palms, respectively. The results implied that trees will have the better ability to tolerate climate change impacts such as droughts than palms due to its slower responses to the environments. In other words, trees use water more conservatively than palms. However, the impacts may not be too severe because of their mechanism to recharge the stem water storage as seen from significant nocturnal J_s. Thus, trees should be preferred to plant in an urban setting than palms because they would be less affected by changing from the environment. In addition, we suggest that maintaining trees water use by appropriate irrigation and selecting trees for planting with suitable species are the keys to maximise urban greening benefits.

Keywords: urban greening, water management, sap flux density, vapor pressure deficit, Tabebuia argentea, Ptychosperma macarthurii

Comparison of stand transpiration in a palm and a tree species and its variation with weather conditions in Bangkok

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Global warming is a significant and ongoing problem to our planet as it induces drought, flood, and climate change and also affects biodiversity. Many countries in certain regions may suffer from increased intensity and frequency of drought events. Urbanization is another emerging issue and can intensify the global warming due to dense population and activities driving carbon dioxide emission. Therefore, urban greening has been imposed in many cities to mitigate such adverse effects. The severe droughts will influence tree water use and potentially affect the performance of urban trees. To explore selectively planting drought-tolerant trees that use water conservatively will lead to efficient urban water management. Here, we studied water use of a palm species (*Ptychosperma macarthurii*) and a tree species (*Tabebuia argentea*) in a roof garden, using the heat dissipation method to measure their sap flux density (J_s). We found that palms had higher sap flux density (the product of J_s and sapwood area) compared to trees in both rainy and rain-free conditions. Sap flux density in palms had exponentially saturated pattern with vapor pressure deficit (VPD), representing atmospheric demand, in both conditions, suggesting stomatal sensitivity at high VPD. However, variations of sap flux density in trees with VPD were different under rainy and rain-free conditions. Trees sap flux density in rain-free condition had exponentially saturated pattern whereas that in rainy conditions followed a linear function because of non-limiting water availability. Our results indicated that trees closed their stomata at a slower rate and had lower stand transpiration rate than palms (0.59 ±0.13 mm day^{-1} *versus* 2.01 ±0.31 mm day^{-1}, respectively). Thus, when trees and palms suffer from drought, palms will potentially dry out faster than trees. Additionally, we derived a simple model using daily sap flux density to estimate monthly and annual sums of water use. Overall, palms stand transpiration rate had 3.4-times higher than trees in our site. This study provides quantitative insights into tree and palm water use characteristics which will strongly benefit water management policy, particularly when the planet face severe drought in the future.

Keywords: stand transpiration, Ptychosperma macarthurii, Tabebuia argentea, vapor pressure deficit, water management, urban greening

