The Tropic of Cancer in Taiwan: Preliminary Approaches to Regional Colors

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ABSTRACT

Environmental colors heavily relate to geographical climates, latitudes, altitudes, and the whole landscape being envisaged by the interaction between nature and culture. As a result, the countries and regions where the Tropic of Cancer 23.5° passes, owing to their very diverse landscape, exhibit great differences in their environmental and cultural colors of natural landscape. Taiwan, situated between the Pacific Ocean and the Taiwan Strait, has owned a very critical position. Thanks to the coverage by the Tropic of Cancer, Taiwan prides itself with the richest biodiversity. Accordingly, this paper, based upon field surveys, explores how the Tropic of Cancer renders environmental characteristics and a splendid variety of landscape colors. With preliminary studies on chromatogram and literature reviews, it is the objective of this paper to build a cross-Asia, even a global, database of diverse landscape colors endowed by the trajectory of the Tropic of Cancer.

INTRODUCTION

Studies of environmental chromatics have been very challenging because they involve with disciplines outside of traditional color science—geographical climate, latitude, altitude above sea level, and regional characteristics related with specific topography and geomorphology, land, and vegetative eco environments. With so many fields interrelated, a common base that integrates all these fields is not seen yet; comparative studies on environmental chromatics are still limited.

This paper suggests that we use "environmental color" as a new aspect with which a system of environmental observation is established. In this study, a geographically shared climatic condition—Tropic of Cancer—will be used as a "global cross section" to show how different geologies, different topographies, different geomorphologies and micro-climates can form landscape color features—thereby proving both of the diversity and universality of environmental color.

As a pilot project, this paper intends to investigate the areas, towns, and environmental color through which the Tropic of Cancer goes in Taiwan. Under the same latitude, it is inspiring to see how environmental color varies in regard to different areas. As a result, the elements that influence the scale of environmental color can be sorted out. Based upon this study, it is hoped that more cross-continent and cross-city studies can be developed into an integrated platform so as to initiate more exchanged analyses and research. Finally, the "color code" presented in this study will also help establish "environmental color" as a scientific and universal subject, enhancing the living condition and sharpening the alertness toward climate change.

APPROACHES

Study assumptions:

1. Conditions of geological climate (including sunlight, rain falls, latitude, altitude, etc.) influence the presentation of natural and liberal colors among regions.
2. The key factor that has an effect on environmental color landscape is sunlight. Under the same latitude, the amount of sunlight appears similar, which offers an objective basis on which landscapes can be compared.
3. Geomorphology (including latitude above sea level) affects temperature and rain falls. Such a factor of geological climate further affects the ecological system, which also indirectly results in differences of regional environmental color.

GLOBAL SCALE — STUDIES ON PHENOMENA

When we draw the Tropic of Cancer from East to West, the section will pass through the Pacific Ocean, the South China Sea, the Bay of Bengal, the Arabian Sea, the Red Sea, the Atlantic Ocean, the Mexico Gulf, and back to the Pacific Ocean. This section covers an

extreme presentation of rain falls: from no rain falls in one year to such a high rate as 3100mm on Taiwan's mountains. In other words, the coverage of the Tropic of Cancer includes both desserts and very humid and rainy subtropical mountainous areas. Certainly, such a variation has to do with the geomorphology through which the cross section goes. Besides, ocean currents and monsoons also have an effect on geographical climate. This is why, from Oman to the West Sahara, there are all dry and unsheltered desserts. If viewed under the satellite, this area shows a gradient that shifts from green to earthy yellow.

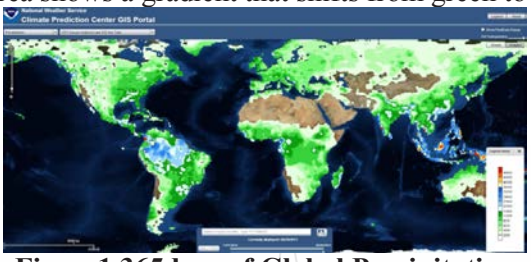


Figure1.365days of Global Precipitation

(Source : http://www.cpc.ncep.noaa.gov/products/GIS/map_viewer/cpcgis.html, 2013/09/29)

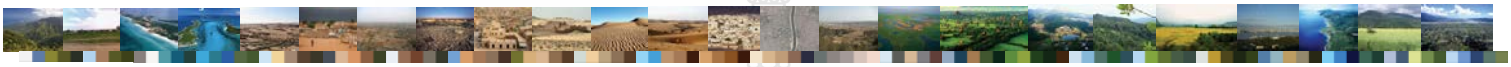


Figure2.Resprestation Color Cross Tropic of Cancer in Global Scale

The spotted parts are small oasis and oceans that are divided by topography. Such landscape and natural ecological characteristics also reflect upon folk customs on this cross section, including architectural material, settlements of dwellings, and traditional clothing. Of course, religious beliefs also can tell how different culture characteristics exist on the same cross section. It is also obvious that in desserts, in order to resist strong sunlight, ultraviolet, and sand storms, the clothing of Muslims resonates with their land color—a convention that also helps reduce radiation from heat. The appearance of their buildings must also keep conservative, coordinating with their land color. Conversely, the low key in their outlook and buildings stimulates them to pursue very colorful styles in their interior design and accessories. Such a contrast exhibits an interesting case study for environmental color and cultural color.

In the same area with the same latitude, high humidity, high temperature and coastlines, monsoons can bring abundant rain falls. This mild and wet geographical climate results in dense vegetation and plants, high biodiversity—thereby rendering very rich natural colors. Overall, settlements in this area must adapt to such an environment: drainage and interception systems must be considered; special building designs, such as pitched roofs and drainage devices, are commonly seen. Clothing and interior design in this area are different from those in desserts. Here, colors of clothing and interior decorations appear subsidiary, which smoothly dissolves with the environment.

To sum up, factors that are used to analyze geographical color on the same cross section in a global scale may include: latitude, topography, distances from sea, wind (monsoons and ocean currents).

REGIONAL SCALE— STUDIES ON PHENOMENA

This pilot study consists of both a survey of environments and preliminary analyses on the environmental color of Taiwan's cross section under the Tropic of Cancer. It is used as a case study of Regional Scale.

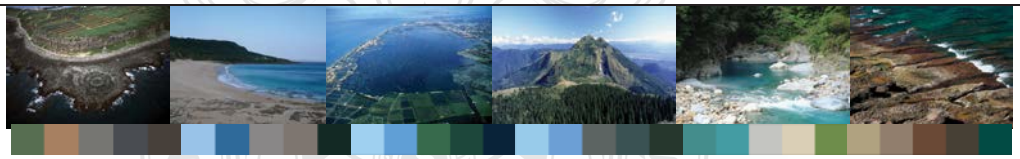
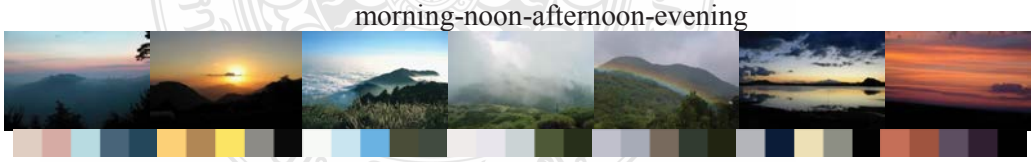
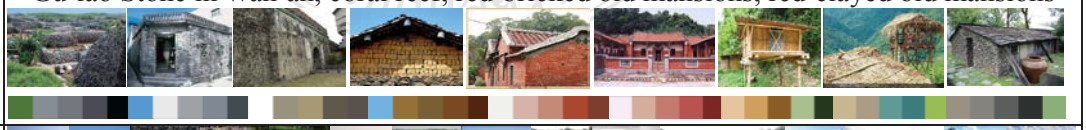
Compared with any area on the same latitude that is covered by the Tropic of Cancer around the world, Taiwan embraces the biggest amount of topographical variations, including off shore islands, a home island, coastlines, plains and mountains. Although, in regard of general worldwide geographical climate, Taiwan belongs to tropical monsoon climate, it witnesses a very dramatic combination. Since Taiwan experienced a special mountain building movement, between North Latitude 22˚ to 25˚, Taiwan's altitude shifts from the sea level to 3952m—a theatrically gradient shift that brings up great diversity. Moreover, speaking of microclimate, the gradient of plant adaptation can be divided into three climate ecological section: humid tropical zone, humid temperate zone, and polar zone. Subsequently, it can even be categorized

into six subfields: savanna, subtropical dryness, temperate rain forest, subtropical zone, sub-polar zone, and tundra.

Accordingly, the hue tone of environmental color can be distinguished from vegetation groupings and soil characteristics. Basically, in this cross section, plain areas include coastline plains, hills, monsoon rainforests, and rain forests, mountainous areas include fagaceae forest, small vegetation areas of pine trees, while only high mountains witness tundra. Because of the Central Mountain Ranges lying in the middle of Taiwan like a string of walls, the overall environmental color of Taiwan is thus determined by humidity. From west to east, the environment appears from dry to humid. As soon as the Central Mountains embraces full water in the air, such humidity continues to the east coast. The vegetation of this cross section, consequently, shows a unique picture because factors of geographical environments all orchestrate here—ranging from tropical to cold zones. As environmental color is concerned, colors of yellow, green, and silver grey green—shown from very dry sand rocks in Penghu, Sisal Agave on sand beaches—gradually encounter mountains, where there are evergreen broad-leaf forest and pine trees. Then, the environmental color transforms into a platform of tundra, where there are Orientalis Arborvitae and Rhododendron shrub, and earth colors by grey, yellow tiny rocks.

As far as culture landscape is concerned, most of Taiwan's rural residences and farm houses are built upon clay, red bricks and grey tiles, viewed from landscape of an intermediate scale, such construction material exhibit local characteristics of "brick" and "clay" —a very representative case is the traditional settlement in Penghu's Wan-an.

Table1.Characteristics of the Environmental Color in the Cross Section Covered by the Tropic of Cancer

Topography	sandy coast---mountain---coastline  0(m)----------3952(m)----------0(m)
Soil/Geology	
climate	morning-noon-afternoon-evening 
caracteristics of settlements	Gu-lao Stone in Wan-an, coral reef, red-bricked old mansions, red-clayed old mansions 
Landcover (vegetation)	

DISCUSSION AND PROSPECT

This paper, an expression of ambition, attempts to frame a structure in which a globally cross-regional study on environmental color is indispensable. Such a study waits for correlation and linkage from fields such as natural ecology, humanistic history, geographical climate, and others. If any researcher or institute would like to join this cross-regional project, it is advised that regions under the coverage of the North Latitude 23.5° are mutually under the same basis of earth science. It seems very likely that studies on environmental color may be expanded into a globally interrelated applied science.

Tentative conclusions are seen as followed:

1. Factors that have an effect on environmental color are those that belong to natural phenomena:
   geology, temperature, biology, topography, height, microclimate, soil, temperature, rain falls, vegetation, sea, river.
   Factors of culture also play an important role:
   living patterns, forms of industries, land use, patterns of settlements, folklores and customs, religions. Both factors of nature and culture may have cause-effect relationships.
2. Environmental color also serves as an indicator for the transformation of environmental characteristics, including :climate change, environmental change, biodiversity, landscape diversity, diversity of agricultural production, cultural diversity.
3. Latitude is not the absolute factor that determines environmental color. Altitude above sea level and geomorphology also affect environmental color.
4. Microclimates create complex diversity between mankind and land use, and they also influence characteristics of seasonal and space-temporal environmental color of a region.

SUGGESTIONS FOR FURTHER STUDIES AND EXPECTATIONS

Environmental color, a mixed variety of characteristics based upon time, season, and culture, has transformed into an invisible heritage of nature and culture. Thus, further studies with systematic framework are very promising; building a database of environmental color is also very much anticipated. Suggestions are as followed:

1. Conduct an integrated study on the basis of a global cross section.
2. Conduct comparative studies on characteristics of special-featured landscape and landscape color under the same latitude:
3. Conduct research on how civilization has affected land use, thereby causing discordant environmental color.
4. Build methodologies across temporal scopes and scale.
5. Develop regional environmental color into an indicator of Reading Landscape.

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