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Identification of Land - Use Attributes

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ABSTRACT

Land use involves the management and modification of natural environment or wilderness into built environment such as settlements and semi-natural habitats such as arable fields, pastures, and managed woods. Land use by humans has a long history, first emerging more than 10 thousand years ago. It has been defined as "the purposes and activities through which people interact with land and terrestrial ecosystems" and as "the total of arrangements, activities, and inputs that people undertake in a certain land type". Land use is one of the most important drivers of global environmental change. Land use practices vary considerably across the world. The United Nations' Food and Agriculture Organization Water Development Division explains that "Land use concerns the products and/or benefits obtained from use of the land as well as the land management actions (activities) carried out by humans to produce those products and benefits." As of the early 1990s, about 13% of the Earth was considered arable land, with 26% in pasture, 32% forests and woodland, and 1.5% urban areas. Land change modeling can be used to predict and assess future shifts in land use. As Albert Guttenberg (1959) wrote many years ago, "'Land use' is a key term in the language of city planning." Commonly, political jurisdictions will undertake land-use planning and regulate the use of land in an attempt to avoid land-use conflicts. Land use plans are implemented through land division and use ordinances and regulations, such as zoning regulations. Management consulting firms and non-governmental organizations will frequently seek to influence these regulations before they are codified.

KEYWORDS: *Identification, Attributes, Land-Use, Development, Practices, Management, Ecosystem*

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INTRODUCTION

In colonial America, few regulations were originally put into place regarding the usage of land. As society shifted from rural to urban, public land regulation became important, especially to city governments trying to control industry, commerce, and housing within their boundaries. The first zoning ordinance was passed in New York City in 1916, and, by the 1930s, most states had adopted zoning laws. In the 1970s, concerns about the environment and historic preservation led to further regulation.[1,2]

Today, federal, state, and local governments regulate growth and development through statutory law. The majority of controls on land, however, stem from the actions of private developers and individuals. Three typical situations bringing such private entities into the court system are: suits brought by one neighbor against another; suits brought by a public official against a neighboring landowner on behalf of the public; and suits involving individuals who share ownership of a particular parcel of land. In these situations, judicial decisions and enforcement of private land-use arrangements can reinforce public regulation, and achieve forms and levels of control that regulatory zoning cannot. There is growing concern that land use regulation is a direct cause of housing segregation in the United States today.[3,4]Two major federal laws have been passed in the last half-century that limit the use of land significantly. These are the National Historic Preservation Act of 1966 (today embodied in 16 U.S.C. 461 et seq.) and the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.).[5,6]The

US Department of Agriculture has identified six major types of land use in the US. Acreage statistics for each type of land use in the contiguous 48 states in 2017 were as follows:

US land use (2017)

Use	acreage (M)	km^2 (M)	% of total
Pasture/range	654	2.647	35
Forest	538.6	2.18	28
Cropland	391.5	1.584	21
Special use*	168.8	0.683	9
Miscellaneous*	68.9	0.279	4
Urban	69.4	0.281	4
Total**	1,891	7.653	100

Special use areas include national parks (29 M acres) and state parks (15 M), wildlife areas (64.4 M), highways (21 M), railroads (3M), military bases (25 M), airports (3M) and a few others. Miscellaneous includes cemeteries, golf courses, marshes, deserts, and other areas of "low economic value". The total land area of the US is 9.1 M km2 but the total used here refers only to the contiguous 48 states, without Alaska etc.

Land use and land management practices have a major impact on natural resources including water, soil, nutrients, plants and animals. Land use information can be used to develop solutions for natural resource management issues such as salinity and water quality. For instance, water bodies in a region that has been deforested or having erosion will have different water quality than those in areas that are forested. Forest gardening, a plant-based food production system, is believed to be the oldest form of land use in the world.[7,8]

The major effect of land use on land cover since 1750 has been deforestation of temperate regions. More recent significant effects of land use include urban sprawl, soil erosion, soil degradation, salinization, and desertification. Land-use change, together with use of fossil fuels, are the major anthropogenic sources of carbon dioxide, a dominant greenhouse gas.

According to a report by the United Nations' Food and Agriculture Organization, land degradation has been exacerbated where there has been an absence of any land use planning, or of its orderly execution, or the existence of financial or legal incentives that have led to the wrong land use decisions, or one-sided central planning leading to over-utilization of the land resources - for instance for immediate production at all costs. As a consequence the result has often been misery for large segments of the local population and destruction of valuable habitats and ecosystems.[9,10]

DISCUSSION

The urban growth boundary is one form of land-use regulation. For example, Portland, Oregon is required to have an urban growth boundary which contains at least 20,000 acres (81 km^2) of vacant land. Additionally, Oregon restricts the development of farmland. The regulations are controversial, but an economic analysis concluded that farmland appreciated similarly to the other land. LADSS, or land allocation decision support system, is an agricultural land-use planning tool developed at The Macaulay Institute. More recently the term LADSS is used to refer to the research of the team behind the original planning tool. The LADSS planning tool is implemented using the programming language G2 from Gensym alongside a Smallworld GIS application using the Magik programming language and an Oracle database. LADSS models crops using the CropSyst simulation model. LADSS also contains a livestock model plus social, environmental and economic impact assessments. LADSS has been used to address climate change issues affecting agriculture in Scotland and Italy. Part of this work has involved the use of General Circulation Models (also known as Global climate models) to predict future climate scenarios. Other work has included a study into how Common Agricultural Policy reform will affect the uplands of Scotland, an assessment of agricultural sustainability and rural development research within the AGRIGRID project.[11,12]

Land-use forecasting undertakes to project the distribution and intensity of trip generating activities in the urban area. In practice, land-use models are demand-driven, using as inputs the aggregate information on growth produced by an aggregate economic forecasting activity. Land-use estimates are inputs to the transportation planning process.The discussion of land-use forecasting to follow begins with a review of the Chicago Area Transportation Study (CATS) effort. CATS researchers did interesting work, but did not produce a transferable forecasting model, and researchers elsewhere worked to develop models. After reviewing the CATS work, the discussion will turn to the first model to be widely known and emulated: the Lowry model developed by Ira S. Lowry when he was working for the Pittsburgh Regional Economic Study. Second and third generation Lowry models are now available and widely used, as well as interesting features incorporated in models that are not widely used. Today, the transportation planning activities attached

to metropolitan planning organizations are the loci for the care and feeding of regional land-use models. In the US, interest in and use of models is growing rapidly, after an extended period of limited use. Interest is also substantial in Europe and elsewhere.

Even though the majority of metropolitan planning agencies in the US do not use formal land-use models, we need to understand the subject: the concepts and analytic tools shape how land-use/transportation matters are thought about and handled; there is a good bit of interest in the research community where there have been important developments; and a new generation of land-use models such as LEAM and UrbanSim has developed since the 1990s that depart from these aggregate models, and incorporate innovations in discrete choice modeling, microsimulation, dynamics, and geographic information systems.

Land use, land-use change, and forestry (LULUCF), also referred to as Forestry and other land use (FOLU), is defined by the United Nations Climate Change Secretariat as a "greenhouse gas inventory sector that covers emissions and removals of greenhouse gases resulting from direct human-induced land use such as settlements and commercial uses, land-use change, and forestry activities." LULUCF has impacts on the global carbon cycle and as such, these activities can add or remove carbon dioxide (or, more generally, carbon) from the atmosphere, influencing climate. LULUCF has been the subject of two major reports by the Intergovernmental Panel on Climate Change (IPCC), but is difficult to measure. Additionally, land use is of critical importance for biodiversity.[13]

RESULTS

Traditionally, earth system modeling has been used to analyze forests for climate projections. However, in recent years there has been a shift away from this modeling towards more of mitigation and adaptation projections. These projections can give researchers a better understanding of what future forest management practices should be employed. Furthermore, this new approach to modeling also allows for land management practices to be analyzed in the model. Such land management practices can be: forest harvest, tree species selection, grazing, and crop harvest. These land management practices are implemented to understand their biophysical and biogeochemical effects on the forest. However, there is a major lack of available data for these practices currently, so there needs to be further monitoring and data collecting to help improve the accuracy of the models.

The United Nations' Intergovernmental Panel on Climate Change's (IPCC) Special Report on Climate Change and Land (SRCCL), also known as the "Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems", is a landmark study from 2019 by 107 experts from 52 countries. The SRCCL provides a comprehensive overview of the entire land-climate system for the first time and decided to enlist land as a "critical resource". The IPCC's 50th session (IPCC-50) formally adopted the SRCCL's Summary for policymakers (SPM) and approved the underlying report. The SPM and the full text of Special Report on Climate Change and Land—in an unedited form—were released on 8 August 2019. The report is over 1,300 pages long and includes the work of 107 experts from 52 countries. The IPCC Twitter account announced the release of the report with, "Land is where we live. Land is under growing human pressure. Land is a part of the solution. But land can't do it all." The report is the second of three Special Reports in the current Sixth Assessment Report (AR6) cycle which began in 2015 and will be completed in 2022. The first was Special Report on Global Warming of 1.5 °C, and the third is the Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC) released on 25 September 2019. The AR6 cycle is considered by the IPCC to be their most ambitious since the panel was formed in 1988[14,15]

Satoyama (里山) is a Japanese term applied to the border zone or area between mountain foothills and arable flat land. Literally, sato (里) means village, and yama (山) means hill or mountain. Satoyama have been developed through centuries of small-scale agricultural and forestry use. The concept of satoyama has several definitions. The first definition is the management of forests through local agricultural communities, using coppicing. During the Edo era, young and fallen leaves were gathered from community forests to use as fertilizer in wet rice paddy fields. Villagers also used wood for construction, cooking and heating. More recently, satoyama has been defined not only as mixed community forests, but also as entire landscapes that are used for agriculture. According to this definition, satoyama contains a mosaic of mixed forests, rice paddy fields, dry rice fields, grasslands, streams, ponds, and reservoirs for irrigation. Farmers use the grasslands to feed horses and cattle. Streams, ponds, and reservoirs play an important role in adjusting water levels of paddy fields and farming fish as a food source.

Throughout the 80s and 90s, the satoyama conservation movement was implemented in Japan. As of 2001, there are more than 500 environmental groups that work for the conservation of satoyama. Because of their efforts, satoyama has become more prevalent in Japanese landscapes. The Satoyama Initiative was established at UNESCO headquarters in Paris in 2009 as a global effort to realize "societies in harmony with nature" through the recognition and promotion of satoyama landscapes and similar landscapes around the world as a good model for conservation of biodiversity and human well-being. In 2010, the Satoyama Initiative was recognized in Decision X/32 of the Conference of the Parties to the Convention on Biological Diversity (CBD COP) as "a potentially useful tool to better understand and support human-influenced natural environments for the benefit of biodiversity and human well-being" and "consistent and in harmony with the Convention". The International Partnership for the Satoyama Initiative was also launched at the same CBD COP meeting and taken note of in the Decision as " one mechanism to carry out activities identified by the Satoyama Initiative including collecting and analysing case-studies, distilling lessons, and promoting research on different practices of sustainable use of biological resources, as well as increasing awareness and supporting on-the-ground projects and activities in human-influenced natural environments"[14]

CONCLUSIONS

A synanthrope (from the Greek σύν syn, "together with" + ἄνθρωπος anthropos, "man") is a member of a species of wild animal or plant that lives near, and benefits from, an association with human beings and the somewhat artificial habitats that people create around themselves (see anthropophilia). Such habitats include houses, gardens, farms, roadsides and rubbish dumps. The category of synanthrope includes many species regarded as pests. It does not, however, include domesticated animals such as cattle, honeybees, pets, poultry, silkworms, and working animals. Examples of synanthropes are various insect species (lice, ants, silverfish, cockroaches, etc.), house sparrows, rock doves (pigeons), various rodent species, Virginia opossums, raccoons, certain monkey species, coyotes, urban ferals, and other urban wildlife. The brown rat is counted as one of the most prominent synanthropic animals and can be found in almost every place there are people. Rats benefit from living alongside humans.

Urban wildlife is wildlife that can live or thrive in urban/suburban environments or around densely populated human settlements such as townships. Some urban wildlife, such as house mice, are synanthropic, ecologically associated with and even evolved to become entirely dependent on human habitats. For instance, the range of many synanthropic species is expanded to latitudes at which they could not survive the winter outside of the shelterings provided by human settlements. Other species simply tolerate cohabiting around humans and use the remaining urban forests, green spaces and garden/street vegetations as niche habitats, in some cases gradually becoming sufficiently accustomed around humans to also become synanthropic over time. These species represent a minority of the natural creatures that would normally inhabit an area, and contain a large proportions of feral and introduced species as opposed to truly native species. For example, a 2014 compilation of studies found that only 8% of native bird and 25% of native plant species were present in urban areas compared with estimates of non-urban density of species. Urban wildlife can be found at any latitude that supports human dwellings - the list of animals that will venture into urbanized human settlements to forage on horticultures or to scavenge from trash runs from monkeys in the tropics to polar bears in the Arctic. Different types of urban areas support different kinds of wildlife. One general feature of bird species that adapt well to urban environments is they tend to be the species with bigger brains, perhaps allowing them to be more behaviorally adaptable to the more volatile urban environment. Arthropods (insects, spiders and millipedes), gastropods (land snails and slugs) and various worms can also thrive well in the niches of human settlements.[13,14]

Biodiversity banking, also known as biodiversity trading or conservation banking, biodiversity mitigation banks, compensatory habitat, set-asides, biodiversity offsets, are conservation activities that compensate for the loss of biodiversity with the goal of biodiversity maintenance through a framework which allows biodiversity to be reliably measured, and market based solutions applied to improving biodiversity. Biodiversity banking provides a means to place a monetary value on ecosystem services. Typically this involves land protection, restoration, an/or enhancement. Biodiversity banking is often applied so that there is no "net loss of a particular biodiversity feature." According to the International Union for Conservation of Nature, by 2004, interest in voluntary biodiversity offsets was growing in the United States, Brazil, Australia, Canada and the EU. Experience suggested that industry, governments, local communities and conservation groups all benefit from biodiversity offsets or biodiversity banking.[15]

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