EXECUTIVE SUMMARY

Legal Issues in the Use of Geospatial Data and Tools for Agriculture and Natural Resource Management

A Primer

CIMMYT MR

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The world of agriculture and natural resource management increasingly employs approaches that emphasize integrative analyses. Multiple disciplines and sources of information are processed with software-based tools such as geographic information systems (GIS), image analysis, and simulation modeling. These tools are well known for their appetites for data, often obliging users to assemble data from diverse sources. In this process, questions regarding data ownership, data quality, and reliability of products often arise. Similarly, in collaborative efforts and contracted work, questions come up concerning ownership and allowed use of software, including source code. This primer examines concepts of Intellectual Property (IP) and other legal issues relating to GIS used in agriculture and natural resource management. The intent is to provide a guide for day-to-day activities of people involved in agriculture and natural research management. The primer is not, however, a substitute for legal advice. Where specific licensing or contract issues are involved, readers are encouraged to consult legal experts. Choose experts familiar with the topic and who have experience with the relevant geographic jurisdictions, as laws vary from nation to nation.

Spatial information, geographic information, geodata – whatever your favorite term – is first and foremost "information." As information is exchanged among individuals or institutions, questions arise relating to ownership, authorized use, future use, and implied quality:

- If a laboratory purchases a set of point data to create an interpolated map, does the seller retain rights to the mapped data?
- How can a large database, perhaps representing 25 years of labor, be made widely accessible without forfeiting legal control?
- Does the phrase "for non-commercial use only" have any legal meaning?
- Can a novel software algorithm be protected, potentially to generate royalties?
- As a user of "open source" data or software, what are your rights and responsibilities?
- If maps or data sets contain substantial errors, are the providers legally accountable (liable) for damage or losses relating to those errors?

The field of legal issues in GIS is evolving rapidly, and various international agreements and national laws are under discussion that will affect use of spatial data and software. Key issues relate to respecting the rights of owners while avoiding barriers to the flow of data and processed information needed for research in agriculture and natural resource management.

IP Protection Mechanisms

Intellectual property (IP) is any product of human creative activity in industry, science, or art. Intellectual property rights (IPR) are granted by laws and cover two main categories:

1. Copyright and rights related to copyright, which protect literary and artistic works.
2. Industrial property, including patents, industrial designs and trade secrets,

Other mechanisms for protecting data and software include legislated protection of databases, trade secrets, and trademarks (Table 1).

Copyright. Copyright assigns certain rights to creators of literary and artistic works, including books, drawings, and paintings. The concept has been extended to cover computer programs, maps, imagery, and databases. Copyrights *protect the form of expression* of an idea, concept, method or formula, and *not the idea* itself. Protection typically lasts 75 years or longer. As with other types of IPR, the economic rights are often assigned to an employer, especially for "works made for hire," a term that appears in some national copyright legislation or that can be included in contracts to avoid ambiguity regarding ownership. Scientists and educators can generally use copyrighted materials as "fair use," which is specifically allowed in the copyright laws of many nations. Of course, fair use does not permit large portions of copyrighted material to be copied or transferred to third parties. Electronic media have additional protections, such as those granted in the U.S. by the 1998 Digital Millinnium Copyright Act (DMCA).

Table 1. Comparison of basic features of different mechanisms for protecting intellectual property.

	Applicable to				
Mechanism	**Data *per se***	**Databases**	**Software**	**Geographic coverage**	**Comments**
Copyright	No	Yes	Yes	Respected across jurisdictions.	Only protects form of expression, not ideas or data.
Patent	No	No	Yes	Requires application in each country.	Not all countries allow patents on algorithms.
Database protection	Yes	Yes	No	Only available in certain countries.	Concepts of fair use remain to be established.
Written license	Yes	Yes	Yes	Terms used in licenses vary with country (e.g., "work for hire" vs. "contract of/for service").	If well written, provides perhaps the least risk of misunderstanding. Especially useful when dealing with agreements among diverse organizations.
"Shrinkwrap" license	Yes	Yes	Yes	Uncertain	Validity of such licenses is still bein tested in courts.
Trademark	No	No	No	Requires application in each country.	Used only for names and logos.
Trade secret	Yes	Yes	Yes	Laws protecting secrets vary greatly	Requires that deliberate efforts be made to keep information or product secret.

Patents, Petty Patents, Innovation Patents, and Utility Models. Patents grant an inventor a temporary monopoly to exploit an invention, typically for 15 to 20 years. This is done with the expectation that society, as a whole, will benefit if new inventions are publicly disclosed, but that researchers or inventors require a reward or stimulus for making their findings publicly known.

Criteria allowing an invention to be patented can include:

- Novelty — the invention must be new;
- Invention — the product must be the output of an invention process;
- Lack of obviousness — "obvious invention is inevitably not novel";
- Manner of new manufacture — the innovation has not already been used, sold or disclosed to the public; and
- Demonstration of usefulness (utility) — the invention must be able to achieve the useful results claimed in the patent application.

In some jurisdictions, patents may be granted for business models and methods, including software algorithms (which would otherwise only be weakly protected through copyright).

Petty patents, innovation patents, and utility models offer exclusive but shorter protection for technical inventions in several countries. These rights are similar to patents but can be secured more rapidly and cheaply. Legal protection usually is less secure than for a patent, due to a lower standard of search and examination and the absence of a requirement for an inventive step for the issuance of such protection. In GIS and related fields, the US Patent and Trademarks Office has granted a diverse range of patents for software and hardware (Table 2), leaving the impression that research may increasingly be constrained by patented processes.

"Sui generis" Rights for Protection of Databases. The US Supreme Court (in the *Feist* decision) and high courts in Europe ruled that only databases whose creation required an intellectual input can be copyrighted. Databases produced only by "sweat of the brow"—that is, through large efforts—could not be copyrighted. Recognizing that such databases form a significant economic and scientific contribution to society, countries in the European Union have enacted database protection laws that recognize a new, *sui generis,* IP right. While other countries will probably enact similar protections, there is controversy over whether this protection overly restricts use of databases.
Recognizing the weakness and uncertainties surrounding the basic IP protections of copyrights and patents, many owners of large databases license use of their products rather than transferring ownership.

Trade Secrets and Confidential Information. Confidential information, including trade secrets, come under Article 39, Protection of Undisclosed Information, in the WTO TRIPS Agreement. To be considered confidential, information must be secret and have commercial value, and reasonable steps must have been taken to keep it secret. By relying solely on trade secrets to protect IP, however, an inventor runs the risk that another person will produce the same or a similar product, potentially obtaining stronger IP protection (for instance, through a patent).

Trademarks. A trademark is any sign, represented graphically, which is capable of distinguishing goods or services of an undertaking—typically an organization or business. To obtain protection, the owner must register the name in the appropriate jurisdictions. Diverse legislation protects registered owners of trademarks, service marks, and trade

Table 2. Examples of recent US patents related to Geographic Information Systems. The assignee is the individual or entity to whom ownership of the patent was assigned at the time of patent issue, typically the business that employed the inventor(s).

No.	Title	Assignee
6,411,899	Position based personal digital assistant	Trimble Navigation
6,408,107	Rapid convolution based large deformation image matching via landmark and volume *imagery*	(information not available on USPTO database)
6,404,920	System for generalizing objects and features in an image	(information not available on USPTO database)
6,389,356	Geographic information system	Matsushita Electric Industrial Co
6,353,832	Selectivity estimation in spatial databases	Lucent Technologies
6,337,693	Vector-based geographic data	Autodesk
6,327,533	Method and apparatus for continuously locating an object	Geospatial Technologies
6,321,158	Integrated routing/mapping information	DeLorme Publishing Company
6,313,837	Modeling at more than one level of resolution	Schlumberger Technology Corporation
6,308,177	System and method for use and storage of geographic data on physical media	(information not available on USPTO database)
6,307,573	Graphic-information flow method and system for visually analyzing patterns and relationships	(information not available on USPTO database)
6,292,827	Information transfer systems and method with dynamic distribution of data, control and management of information	Shore Technologies
6,282,362	Geographical position/image digital recording and display system	Trimble Navigation Limited
6,269,358	Method and system for similarity-based image classification	
6,262,741	Tiling of object-based geographic information system (GIS)	PRC Public Sector
6,247,019	Object-based geographic information system (GIS)	PRC Public Sector
6,240,424	Method and system for similarity-based image classification	NBC USA
6,240,360	Computer system for identifying local resources	Multipmap.com
6,229,546	Rapid terrain model generation with 3-D object features and user customisation interface	Geosoftware
6,216,130	Geographic-based information technology management system	InGeo Acquisitions
6,115,672	Method for measuring and quantifying amounts of carbon from certain greenhouse gases sequestered in and by grassy and herbaceous plants above and below the soilsurface	Environmentally Correct Concepts
6,107,961	Map display system	Kokusai Denshin Denwa Co

names, and ensure exclusive use of such marks. The period of protection for a registered trademark typically is 7 to 10 years, and protection is usually renewable, subject to payment of additional fees. The main concern in agricultural research is to avoid misuse of trademarks. Before a product is named, trademark registries should be consulted to ensure that the proposed name does not infringe on an existing mark.

Other Forms of IP. Other types of intellectual property covered by major treaties include industrial designs, plant breeders' rights, geographical indications that identify a good as originating in a given place, and integrated circuit layout designs. New types of property rights that cover such IP as traditional knowledge may appear in the near future.

Related terminology. The term "public domain" is often used to indicate "free" or "available gratis," but in a legal context the term implies that that no property rights or restrictions are associated with the product. "Open source" refers to the source code of computer software, whether an operating system, language, or application and implies that anyone can access the source code. "Freeware" is commonly used for software where redistribution but not modification is permitted. The source code is seldom provided. The user has "free license" to use the software but does not own it. Somewhat confusingly, "free software" can be used, copied, and distributed, either verbatim or with modifications, implying that source code must be available. In the case of "shareware," people are free to redistribute copies with the stipulation that anyone who continues to use a copy must pay a license fee.

Table 3. Examples of data use or ownership policies of mapping or data agencies in various countries.

Country	Agency	Cost	Uses allowed
Denmark	Danish Data Archive	No cost	For non-commericial use. May not be redistributed.May only be used for stated purpose after which data must be returned or destroyed.
Ireland	Ordnance Survey Ireland	Varies with intended use	Uses are licensed according to categories of activities (e.g., for architects, solicitors, Internet, etc.)
México	Instituto Nacional de Estadistica, Geografía e Informática (INEGI)	Cost recovery is allowed	Reproduction for commercial gain (*"fines de lucro"*) is prohibited in statement on CD ROM liners.
New Zealand	Crown Research Institutes	Recovery of direct costs is allowed	Open, except where use is not to the benefit of New Zealand
UK	Ordinance Survey	Cost recovery is allowed	Uses are licensed according to categories of activities
USA (Federal government)	United States Geological Survey (USGS)	Reproduction and handling	Unlimited

Some Additional Legal Issues for Geospatial Data and Tools

Liability Regarding Information and Licenses. Anyone who creates, uses, or disseminates spatial information and tools, or services based on the data and tools, faces certain legal responsibilities. Legal risks relating to geodata and GIS include:

- Failure to secure IP rights.
- Liability for infringement of IP rights, whether intended or not, including failure to control access to geodata or tools, resulting in illegal use of the data or tools by others.
- Failure to secure accountability for defective data or GIS tools (including services provided from data and tools).
- Liability for breaching privacy or confidentiality obligations.
- Legal uncertainties involved in contracting out tasks (outsourcing) related to geodata collection, processing, and dissemination, whether by a government agency or for such an agency or private enterprise.

Factors that can mitigate liability include how much care was exercised in developing a product or service, how much was charged, and whether appropriate disclaimers were provided. Licenses that provide such information are a key means of limiting liability, but courts generally decide against attempts to disclaim all liability.

Data Protection for Personal Privacy. Coupling descriptive data to precise location data is the corner stone of many types of spatial analyses. But when locations are easily linked to identities of individuals or farms, there is potential for violating personal privacy. Illegal or unwarranted use of personal information is a serious issue being addressed by multinational legislation. Typical requirements for using personal data are that the data be obtained with informed consent and only be held as long as required for the authorized use.

Conclusion

Researchers and managers working with spatial information should understand the basic differences between protections offered by copyright and patents, as well as the implications of alternate forms of IP protection or management. Compilations of data represent perhaps the most problematic area, and it seems likely that the trend of licensing access to databases will continue. In the software arena, we may see a trend toward increasingly restrictive control of software through patents. Given the uncertainties and complexities of managing IP for spatial information and software tools, many research groups will prefer to deal with collaborations and exchanges of IP through contracts or license agreements. Table 4 provides general recommendations for managing IP associated with spatial information.

Table 4. Abbreviated Recommended Guidelines for Managing Spatial Information IP

Detailed checklists will be available at the CAS web site (www.cgiar.org/isnar/cas).

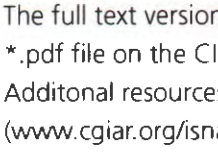
1. Keep a laboratory or project note book that documents:
   - Data sources, data created, enhancements to data.
   - Software used or created.
   - Any transfers of data or software among research groups or institutions.

   The notebook should indicate who did what when and be updated and backed up regularly.
2. Read the license agreements when acquiring software packages or access to data sources.
3. Maintain a physical file containing all data and software transfer agreements.
4. Maintain metadata with references to all data and software transfer agreements.
5. Use a data or software transfer agreement to document terms of any interchange, checking that the terms in the distribution agreement do not conflict with other licenses (e.g., for data from third parties).
6. Provide secure storage for all data (primary and secondary) for a minimum period of 10 years following closure of a project (according to several codes of good practice).
7. If major data sets may need to be traced over time, consider including "digital watermarks" that will allow the owner to identify the data even after it has been extensively modified.
8. When dealing with data that include personal information (e.g., names of individuals or their land holdings), explain the purpose of collecting the data to the affected individuals and establish a clear policy for disposition of the data at the end of the project. Alternatively, manage the data in such a way that identities of individuals are not recorded (e.g., by assigning identification numbers or by aggregating to a level above the individual, farm or whatever).
9. In creating names for products, especially software, conduct a search for similar already trademarked names.

The International Maize and Wheat Improvement Center (**CIMMYT®**; www.cimmyt.org) is an internationally funded, nonprofit, scientific research and training organization. Headquartered in Mexico, CIMMYT works with agricultural research institutions worldwide to improve the productivity, profitability, and sustainability of maize and wheat systems for poor farmers in developing countries. It is one of 16 food and environmental organizations known as the Future Harvest Centers. Located around the world, the Future Harvest (www.futureharvest.org) Centers conduct research in partnership with farmers, scientists, and policymakers to help alleviate poverty and increase food security while protecting natural resources. The centers are supported by the Consultative Group on International Agricultural Research (CGIAR) (www.cgiar.org), whose members include nearly 60 countries, private foundations, and regional and international organizations. Financial support for CIMMYT's research agenda also comes from many other sources, including foundations, development banks, and public and private agencies.

The CGIAR Consortium for Spatial Information (**CSI**; http://www.spatial-info.org) evolved from a collaboration among CGIAR centers and GRID-Arendal with the objective of promoting effective use of GIS in international agricultural development. CSI creates mechanisms for standardizing data sets within the CGIAR, sharing methodologies and solutions, and facilitating inter-center collaboration. CSI serves as a platform for joint efforts in GIS-based agricultural research at global, regional, and local levels. Core membership includes 10 institutions.

The CGIAR Central Advisory Service (**CAS**) on Intellectual Property (http://www.cgiar.org/isnar/cas/) was established by the CGIAR in 1999 to facilitate the exchange of experiences and knowledge among the CGIAR centers and to provide expert assistance on intellectual property matters.



Further Information

The full text version of the primer is available as a *.pdf file on the CIMMYT website (www.cimmyt.org). Additonal resources are available at the CAS web site (www.cgiar.org/isnar/cas).

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