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The International Map of the World and Global Map: Will History Repeat Itself?

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Abstract

This paper looks at two major efforts to produce global map coverage at the scale of 1:1 million. The International Map of the World was proposed by Albrecht Penck in 1891. The history of the IMW has been well documented and, for a variety of reasons, this enterprise failed. Global Map was proposed in 1991 by the Geographical Survey Institute of Japan as part of a major initiative by the Government of Japan in the environmental field. This paper will analyse the origins of Global Map and the progress made so far. It will be argued that the history of IMW need not be repeated and that Global Map can succeed. The project will, however, require renewed commitment from national mapping agencies.

"Mapping is important. Irrespective of the form in which it is held – paper or digital – it underpins many activities of the state and private industry; it facilitates certain types of leisure activities worldwide; and it is central to geographical education and supports the inculcation of good citizenship." (Rhind, 2000: 295)

The International Map of the World (IMW) at the 1:1 million scale was first proposed by Albrecht Penck at the fifth International Geographical Congress in Berne in 1891. Penck argued that the end of the 19th Century was a time when the exploration of the world's land masses was complete and that an opportunity presented itself to bring all of this cartographic material together in an International Map of the World for the common good of humanity (Penck, 1895). His proposal was that national mapping agencies including key countries such as Britain, France, Germany and the United States produce a 1:1 million map of the world with common conventions and symbols with place names expressed in the official language of the nation concerned. As Heffernan has observed "Based on this solid cartographic foundation, a new, twentieth century geography could emerge to ask new and more complex questions about the natural world and its human inhabitants. The explicit objective was to challenge the assumption that cartography was an inherently national or imperial activity undertaken by, and for, specific nation states to facilitate and affirm territorial ambitions (Heffernan, 2002:209). Further resolutions of support for what Heffernan has dubbed "...this remarkable, if ultimately doomed, attempt..." were passed at the International Geographical Congress in London (1895), Berlin (1899), Washington (1904) and Geneva (1908) but it was not until November 1909 that an Inaugural Conference to establish an International Map Committee was held. The Committee established the rules and conventions for the IMW. In 1913 an office to coordinate the project called the Central Bureau was established at the Ordnance Survey. Progress to implement the IMW was slow with only six provisional sheets being produced by the end of 1913. Another resolution in support of the IMW was passed at the 10th International Geographical Congress in Rome in 1913 and later that year a second conference on the IMW was organised in Paris by General Bourgeois, Chief of the French Army Geographic Service. Thirty-four countries were represented and the 80 delegates included politicians, diplomats and civil servants as well as cartographers and geographers (Heffernan, 2002). The geopolitical situation of the time was tense but even before the outbreak of the war in 1914 the United States effectively derailed the project. As Heffernan comments, "Unfortunately, their deliberations were undermined by

the decision of the United States to withdraw from the project in order to develop its own national scheme (overseen by the American Geographical Society) to develop a 1:1 million map of Hispanic America unfettered by international agreements.” (Heffernan, 2002: 210). American impatience over the lack of progress caused by the political machinations and bureaucratic delays of a largely European based committee helped to explain this decision as did the United States’ perspective on what it considered its “sphere of influence”. Unlike the IMW, the American initiative was completed in 1946 (Wright, 1952) and was an important contribution to mapping the hemisphere. The First World War effectively destroyed the IMW. Several attempts were made to revive the idea (MacLeod, 1926) including efforts made by the United Nations (UN, 1954, Gardiner, 1961). The United Nations officially took over the IMW in 1953 and placed it under the jurisdiction of the Economic and Social Council. These attempts to create what Heffernan calls a “Utopian cartography” died a slow and lingering death (Winchester, 1995) when the UN officially abandoned the project in 1986. David Rhind, in the Hotine Lecture in 1999 summarised his views on the reasons for the failure of the IMW as follows: “...lack of commitment to finance it by those who agreed to participate; conflicts in priority with national objectives in a situation where resourced were always limited; the lack of clearly articulated needs which the IMW was designed to meet and demonstration of its success from its use; a lack of clear responsibility for action; the duplication of work given that much of the same material had to be created on different map projections; concerns over the ownership of the results; the exorbitant costs of doing all of this in a pre-computer world.” (Rhind, 1999: 2)

Above all, the geopolitics of national interest at all stages of the history of IMW proved much stronger than the international idealism on which IMW was founded.

Almost exactly one hundred years after the idea of the IMW was proposed a new initiative emerged to create an international map at the 1:1 million in the digital era. A key element in this respect is An Image Survey: Watching the Earth¹ written in Japanese and published in February 1991. This important study has not been cited in the English language literature yet it forms the basis for Global Map, a recent international initiative coordinated by the International Steering Committee for Global Mapping with a secretariat based in the Geographical Survey Institute of Japan (GSI).

Watching the Earth was produced at a time when the Government of Japan was attempting to identify a larger role in international initiatives and international fora. As the title suggests the book dealt primarily with environmental issues and it is important to note that a strategic decision had been taken at Cabinet level to identify and seek out new areas in which Japan could play and international leadership role. This created a political and bureaucratic environment which facilitated new initiatives and provided the funding to implement them. Japan had identified environmental issues as the major focal point for its international aid activities. As Okada (2003) points out, Japan had met considerable success in balancing economic growth and environmental preservation and “To transfer such environmental problem solving know-how to developing countries would constitute a major contribution to the world (Okada, 2003: 26). Japan had become seriously interested in environmental Official Development Assistance (ODA) at the 15th G7 Summit in 1989 and at the United Nations Conference on Environment and Development (UNCED) held in Rio in 1992. Japan announced a major expansion in ODA committed to environment. Agenda 21 (UNCED 1992), especially chapter 40, which came out of that meeting, included a call for global environmental data and the Global Map concept was already in place to respond to this call. Japan saw itself in an important international leadership role on environmental issues and played a very active role in UNCED.

¹ The author is indebted to Minoru Akiyama of GSI for drawing attention to this study and to Kumiko Kurotori of the ISCGM Secretariat for translating sections of the book into English. The author would also like to thank Karen Kline, the Assistant Secretary General of ISCGM, for providing background information on the history of Global Map and ISCGM.

Chapter 4 of Watching the Earth is entitled "Main Challenges for the Surveying and Mapping Sector". It is interesting to note that the suggestions made were distilled from the results of a questionnaire completed by all staff members of the Geographical Survey Institute together with a careful analysis of what had been done before, including the IMW, and the current situation of global environmental mapping in 1990-91. The chapter considered possible initiatives at two scales: 1:1 million for the entire globe and 1:100,000 or larger mainly for developing countries in the Asian region. At the global scale consideration was given to three possibilities: developing a global environmental base map; constructing a global environmental database; and establishing global monitoring systems. Both analogue and digital approaches were considered and approximate costs were worked out. An analogue approach to creating a global environmental base map was estimated to be many more times expense than a digital

One of the earliest papers in English on Global Map was that given on behalf of GSI by Hiroshi Masaharu to the Asian Conference on Remote Sensing held in Mongolia in October 1992 (Masaharu, 1992). This was an early example of the process of extensive international consultation on the concept which was systematically initiated by GSI. The First International Workshop on Global Mapping was held in Izumo, Japan in 1994 and a major result of this meeting was that "The Workshop resolved that Global Map development should proceed with a goal of completion by the year 2000." (GSI, 1996) Two years later the Second International Workshop of Global Map was held in Tsukuba and the International Steering Committee for Global Mapping (ISCGM) was established with Professor Jack Estes as Chair (ISCGM, 1996). In a major address Kunio Nonomura, Director of the Geographical Survey Institute, outlined the details of the Global Map project as a group of global geographic datasets of known and verified quality, with consistent specifications to be widely available to all at minimal cost. Later in 1996 a second meeting of the ISCGM took place in California in conjunction with the Interregional Seminar on Global Mapping for the Implementation of Multinational Environmental Agreements and issued the Santa Barbara Statement recommending that a Global Mapping Forum be created bringing data users and data providers together (ISCGM, 1996b). In 1997 Global Mapping was recognised by the 19th Special Session of the United Nations General Assembly (UNGASS) as part of the Program for Further Implementation of Agenda 21.

Global Mapping Forum 97 was held in Gifu, Japan (ISCGM, 1997). The third meeting of ISCGM took place concurrently and the draft technical specification and an action plan were adopted. Global Mapping Forum '98 took place in Sioux Falls, USA together with the Fourth Meeting of ISCGM (ISCGM, 1998). At that meeting, with a letter of recommendation from the United Nations, ISCGM formally invited the national mapping organisations of all countries to participate in the Global Map Project. Later that year at the Fifth Meeting of ISCGM in Canberra, Australia, the ISCGM adopted the specifications for Global Map and the production of Global Map began (ISCGM, 1998b).

Global Map has eight data layers including vegetation, land cover, land use, elevation, drainage, population centres, boundaries and transportation. Version 1.0 of Global Map was released in 2000 utilising existing global datasets. These included elevation data from GTOPO 30, land characteristics from the 1 km. AVHRR and drainage, transportation, populated places and administrative units from Vector Map Level 0 (initially the Digital Chart of the World). These were to be used and verified by national mapping agencies and formed a foundational database for Global Map.

Without the existence of availability of these datasets progress towards the production of Global Map would have been very slow indeed. Here the positive involvement of the United States has been a critical factor. As Kelmelis has noted "...USGS provided or facilitated getting the various datasets for the Level 0 of Global Map.... These data represent an aggregate investment of many tens of millions of dollars by the US Government and, in some cases, large investments by some of our allies. I believe this was a very generous donation by the leadership of USGS and NIMA at the time." (Kelmelis, December 2002)

If the United States played a role in undermining the IMW as outlined earlier in this paper then it has played exactly the opposite role in the Global Map Project. The support of the United States has been a major factor in the success of the project so far. The 6th Meeting of ISCGM took place at the Cambridge Conference in 1999 (ISCGM, 1999), and the 7th in Cape Town in 2000 (ISCGM, 2000). Later that year at the Global Mapping Forum in Hiroshima, Japan the first edition of Global Map was completed and distributed (ISCGM, 2000b). An eighth meeting of ISCGM was held in Cartagena and a ninth meeting in Budapest in 2002. The 10th Meeting of ISCGM took place in Okinawa, Japan in July 2003 in conjunction with Global Mapping Forum 2003. To date 129 organisations, most of which are national mapping agencies, are involved in the Global Map Project and 12 have fully verified, complete data released. Twenty other nations, including Canada, China and Mexico, have submitted their data to Global Map for verification as has the Scientific Committee for Antarctic Research (SCAR) for the Antarctic continent. These efforts mean that Global Map coverage has been achieved for a substantial portion of the earth's surface and data preparation is far advanced in a number of other countries such as Brazil.

Global Map was an initiative which responded to Agenda 21 and ten years later ISCGM took a prominent role in the preparations for the World Summit on Sustainable Development in Johannesburg in August 2002 and in the Summit itself. ISCGM was involved in four preparatory meetings leading up to the Summit, holding workshops and side events on Global Map at each one. As a result of the involvement of the Global Map Secretariat the World Implementation Document agreed upon by all nations at the Summit contains paragraph 132 which reads as follows: "Promote the development and wider use of earth observation technologies, including satellite remote sensing, global mapping and geographic information systems, to collect quality data on environmental impacts.... c) Encourage initiatives and partnerships for global mapping." (United Nations WSSD, 2002).

The explicit recognition of Global Map is important for a number of reasons. All of the nations which agreed to the World Implementation Document have explicitly agreed to participate in and implement Global Map. This gives national mapping agencies which are responsible for Global Map strong arguments for allocating resources to the creation of Global Map. For every nation which agreed to the World Implementation Document Global Map becomes both a national and international moral obligation. In addition, the designation of ISCGM as a recognized implementation organisation strengthens the case for the participation of national mapping organisations in ISCGM. The Government of Japan, which is providing substantial financial support to the ISCGM Secretariat at GSI has indicated its willingness to continue this support which has been so critical to the implementation of Global Map by actively promoting Global Map at the Summit. Again, this is part of a major thrust of the Government of Japan in the environmental field. In the fiscal year 2000 Japan committed over 32% of its substantial ODA to environmental issues (Okada, 2003). A new initiative, the Environmental Conservation Initiative for Sustainable Development (EcoISD) was announced at the Johannesburg Conference. "The EcoISD comprises three philosophies: human security; ownership and partnership; and pursuit of environmental conservation and development. Under these philosophies five basic policies were established: capacity development in the environment; active integration of environmental concerns; Japan's leading role; cooperation under broad and comprehensive frameworks; and applications of Japanese enterprise and scientific knowledge." (Okada, 2003: 7)

A key element of Global Map is that it is driven and controlled by the national mapping agencies. In this respect there are three levels of involvement designated A, B, and C. Level A involvement requires a national mapping agency to provide and process data for its own country and assist one or more C countries. Level B involvement requires the provision and processing of data only for the country concerned and national mapping agencies in Level C countries receive capacity building support from Level A national mapping agencies. The Geographical Survey Institute of Japan, in cooperation with JICA, the Japanese Government aid agency, has been particularly active in this respect. Again, this reflects one of the major principles of Japanese ODA – "We cannot achieve positive results in tackling environmental

problems unless we form long-term partnerships with people in charge in the recipient countries. To that end 'capacity development' is important in such tasks as nurturing the environment sector in these countries." (Ms. Shiho Kanie, Japanese Ministry of Foreign Affairs Economic Cooperation Bureau, quoted in Okado, 2003: 27) Infrastructure and capacity building has been further encouraged by the announcement in May 2001 by ESRI (the Environmental Systems Research Institute), a leading software company, of a \$5 million grant program to help organisations participate in Global Map (ESRI, 2002). The Estes Global Map/GSDI grant program was established in honour of Professor Jack Estes, the first Chair of ISCGM whose untimely death took place in 2001. The grant provides both software and training. A condition of the grant is that recipient nations place their 1:1 million datasets that meet Global Map specifications on the Geography Network. In August 2003 the Global Map training program offered by GSI and JICA will take place in Nairobi and for the first time will be combined with the training provided by ESRI. It is interesting to note that of the 12 countries which have fully released their data at the time of writing (May 2003) 10 are developing nations.

Regional cooperation is also very much a feature of the Global Map structure. Although several European countries are members of ISCGM in their own right the relatively recent creation of Eurographics to represent all European national mapping agencies means that this agency will take the lead in creating a seamless European-wide contribution to the Global Map Project. This effort is currently being coordinated by the National Survey of Finland.

A number of organisations are represented on ISCGM in an advisory capacity including UNGIWG, the United Nations University, the National Geographic Society and the International Cartographic Association. The International Standards Organization (ISO) and the Committee for Earth Observation Satellites (CEOS) also have liaison status with ISCGM.

For an illustration of Global Map coverage and existing Global Map datasets the reader is referred to the ISCGM Web site at <http://www.iscgm.org/>

Will ISCGM succeed in providing a 1:1 million Global Map by its new target data of 2007 or will history repeat itself and Global Map meet the same fate as the International Map of the World? David Rhind (2000) provides an interesting analysis of the challenges facing global mapping and argues that the most promising way forward is to start again utilising raster data and existing 1:250,000 maps to produce a new global database with leadership and implementation from the private sector. He argues that Global Map is at too small a scale to meet existing needs and although he did not rule out success he was clearly somewhat sceptical

I would argue that starting again is not the best option and that building on the substantial achievements already made by Global Map is a more promising way ahead. This, however, depends on the renewed cooperation and support by national mapping agencies, many of which are represented at this meeting. Rhind (2000) also argues that national mapping agencies have a poor record of cooperation but in recent years I would argue that the success of regional blocs of national mapping agencies in cooperative endeavours belies this assertion. Eurographics is an obvious example but so are the regional groupings in Asia/Pacific, Latin America and to a lesser extent Africa coordinated by the Economic Commission for Africa. Cooperation is a fact of life for most national mapping agencies and there is no necessary conflict among national, regional and international interest in the mapping field. These interests are often complementary, not competitive.

There are similarities between the history of the IMW and the more recent history of Global Map but there are also significant differences. Global Map has a clear focus on the environment as a key issue and all nations realize that this is both a national and international imperative. National action within national borders alone is a necessary, but not

sufficient approach to addressing environmental concerns. Global mapping, of which Global Map is only one element, has clearly demonstrated its utility in environmental planning and monitoring. For an excellent overview of this in the African situation the reader is referred to the study by the National Research Council of the National Academies of the United States entitled Down to Earth: the Geographical Foundations of Sustainable Development published in 2002 and presented to the World Summit on Sustainable Development in Johannesburg (NRC, 2002). The geopolitics of national interest, which helped to destroy IMW, are not present in the same form today. There is a much stronger realisation that international action on the environment is required as evidenced by the wide support given to Agenda 21 and ten years later to the plan of action agreed upon in Johannesburg. Unlike IMW Global Map is meeting defined needs and is demonstrating its ability to address these needs.

Through ISCGM, and with the financial support of the Government of Japan, there is a clear responsibility for action and a strong secretariat in the Geographical Survey Institute of Japan which continues to systematically and efficiently move Global Map ahead. This was not the case for IMW. In addition Global Map is not an isolated action on the part of GSI but is an integral part of a major environmental focus of the Government of Japan involving several ministries.

Global Map builds on existing efforts rather than duplicating these as was the case with IMW and, as outlined earlier, the ongoing support of the United States in providing global datasets has been critical to the success of Global Map.

The costs of producing and International Map of the World in analog form were exorbitant. Global Map is being built in the computer era where costs of such endeavours are less. It is also taking advantage for the very substantial investments which have already been made by nations such as the United States and adding value to them.

Global Map still faces many challenges. In technical terms the 5° latitude tiling system, which is based upon the Vector Product Format (VPF) used for Vector Map Level 0, has proven difficult to meet operationally and the approach is currently being revisited. Global Map specifications may also be too rigid. Given increased interoperability the need for a single specification has decreased. Again this is an issue that is being reconsidered.

In 2002 ISCGM took the decision to utilize raster data more effectively in the production of Global Map and formed a new working group to carry this initiative forward in close cooperation with CEOS.

The issue of scale is an important one. For many environmental uses the 1:1 million scale is appropriate, especially when dealing with global, hemispheric, continental or regional issues but at the national scale it has its limitations. This is especially the case for smaller nations but also for nations such as the United States. Kelmelis comments, "The United States is still committed to the concept of Global Map. We believe, however, to truly be of value for development the scale and resolution must be more useful for regional and local decision making." (Kelmelis, 2002) The ISCGM at its Budapest meeting in 2002 took the decision to examine the implications of accepting data at the 1:250,000 scale.

The key challenge is, however, that of commitment and active involvement of the national mapping agencies that have agreed to be part of Global Map and in this sense Global Map is no different from IMW.

As outlined earlier in this paper much has been achieved. However, progress has been slower than anticipated. Only 12 nations have fully delivered in their Global Map commitment although a further 20 have submitted their data for verification and formatting. These include two of the world's largest countries, Canada and China, giving Global Map an impressive percentage of coverage in terms of area, especially when the Antarctic continent is added

but much remains to be done. Here the involvement of the national mapping agencies represented at this conference is critical and as the new Chair of ISCGM I appeal to all of you for a renewed commitment to Global Map. Budget constraints are universal and national mapping agencies have seen governments cut their budgets and demand increasing cost recovery. These are realities facing everyone but using the argument that involvement with Global Map will help national governments meet their commitments to the Johannesburg Summit may help to free up some additional funds for this important collaborative endeavour. History certainly need not be repeated; with your help Global Map can and will succeed.

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