

# **DESIGNING THE NATIONAL SPATIAL DATA INFRASTRUCTURE FOR JORDAN**

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**DESIGNING THE NATIONAL SPATIAL DATA INFRASTRUCTURE FOR  
JORDAN**

**by**

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## **DEDICATION**

To my beloved Father, who's my first teacher, for earning me an honest living and for supporting and encouraging me to believe in myself.

To my second teacher, my dearest mother, who has to bear my absence during the time of my study and whose endless love, patience and prayers have never stopped supporting me during my journey. Thank you, mom.

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## LIST OF ABBREVIATIONS

AABU	Al al-Bayt University
ADC	Aqaba Development Company
AMS	Army Map Service
ANZLIC	Australia New Zealand Land Information Council
ASDD	Australian Spatial Data Directory
ASDI	Australian Spatial Data Infrastructure
ASEZA	Aqaba Special Economic Zone Authority
AWC	Aqaba Water Company
BAU	Al-Balqaa Unversity
BAU	Al-Balqaa Unversity
CAP	Common Agriculture Policy
CCOG	Canadian Council on Geomatics
CGDI	Canadian Geospatial Data Infrastructure
CIG	Canadian Institute of Geomatics
CSDI	Canadian Spatial Data Infrastructure
DLS	Department of Lands and Survey
DOA	Department of Antiquities
DOM	Digital Ortho-photo Map
DOS	Department of Statistics
EUROGI	European Umbrella Organization for Geographic Information
FGDC	Federal Geographic Data Committee
GAM	Greater Amman Municipality

GI	Geographic Information
GIAC	Geomatics Industry Association of Canada
GIS	Geographic Information System
GML	Geography Markup Language
GOJ	Government of Jordan
GSDI	Global Spatial Data Infrastructure
IACG	Inter-Agency Committee on Geomatics
ICDE	Infraestructura Colombiana de Datos Espaciales {Colombian Spatial Data Infrastructure}
IDECO	Irbid District Electricity Company
INFOGRAH	Infogrph company
INSPIRE	Infrastructure for Spatial Information in Europe
IRBID	Municipality of Irbid
ISDI	Indonesian Spatial Data Infrastructure
ISO	International Organization for Standardization
JIC	Jordan investment commission
JNSDI	Jordan national spatial data infrastructure
JSDI	Jordan Spatial Data Infrastructure
JTM	Jordan Transverse Mercator
KML	The Keyhole Markup Language
LPIS	Land Parcel Identification system
LTRC	Land Transport Regulatory Commission
MIYAHUNA	Jordan Water Company
MOA	Ministry of Agriculture
MOENV	Ministry of Environment

MOICT	Ministry of Information Technology and Communication
MOMA	Ministry of Municipal Affairs
MOPWH	Ministry of Public Works and Housing
NEPCO	National Electricity Power Company
NGII	National Geographic Information Infrastructure
NGO	non-government organizations
NRA	Natural Resources Authority
NRCAN	Natural Resources Canada
NSDB	National Soil Database
NSDI	National Spatial Data Infrastructure
NSIF	National Spatial Information Framework
OGC	Open GIS Consortium
OMB	Office of Management and Budget
ORANG	Orange Telecommunications
PDTRA	Petra Development and Tourism Region Authority
RAVI	the Dutch council for Real Estate Information
RJGC	Royal Jordanian Geographic Centre
RSCN	The Royal Society for the Conservation of Nature
SASDI	South African Spatial Data Infrastructure
SDDF	Spatial Data Discovery Facility
SDI	Spatial Data Infrastructure
SDICS	Spatial Data Interest Communities
SGA	State Geodetic Authority
SLD	The Styled Layer Descriptor

UTM	Universal Transversal Mercator
W3C	World Wide Web Consortium
WAJ	Water Authority of Jordan
WCS	Web Coverage Services
WFS	Web Feature Services
WMC	Web Map Context
WMS	Web Map Services
YWC	Yarmouk Water Company
ZARQA	Municipality of Zarqa

## **MEREKA BENTUK DATA INFRASTRUKTUR RUANG UNTUK JORDAN**

### **ABSTRAK**

Pembangunan pengumpulan data ruang (spatial) dan penggunaannya memainkan peranan penting dalam perjalanan aktiviti pembangunan infrastruktur data ruang (SDIs). SDI terdiri daripada teknologi, piawaian dan polisi (i.e. kerangka kerja berinstitusi), sumber manusia (i.e. orang) dan prosedur organisasi untuk memperoleh, menyimpan, memproses, mengagihkan dan mempertingkatkan penggunaan maklumat geo-ruang. Dalam memperkuat pembangunan dan liabiliti maklumat data ruang, status pembangunan SDI negara lain amat perlu diketahui. Terdapat banyak agensi awam dan swasta di Jordan yang memberi tumpuan kepada pengeluaran, penggunaan dan perkongsian data ruang bagi memenuhi keperluan komuniti geo-maklumat. Jordan tidak mempunyai kerangka kerja organisasi, dan terdapat lowong institusi terhadap tanggungjawab kepimpinan berkenaan GIS. Kebanyakan organisasi lebih gemar menubuhkan jawatankuasa GIS nasional yang bebas dengan memberikan kuasa, akauntabiliti, dan mandat sah kepada jawatankuasa tersebut dalam pengurusan kerja GIS seluruh negara. Namun demikian, akan terdapat beberapa cabaran untuk NSDI di Jordan seperti isu saling kendali, kurang dana, dokumentasi data, pembangunan polisi ke atas perkongsian data dan strategi nasional. Oleh kerana NSDI tidak serupa di seluruh dunia (Cetl, Roić, et al., 2009) maka adalah penting untuk Jordan membangunkan strategi nasional secara tersendiri. Sebaliknya, terdapat banyak kebaikan seperti menghalang duplikasi data ruang, menghapus keterulangan data ruang, meningkatkan kolaborasi di kalangan organisasi dan memperbaiki pembangunan ekonomi jabatan peringkat yang berlainan. Dalam menghasilkan strategi infrastruktur data ruang (NSDI), langkah

pertama ialah kesedaran bahawa persekitaran kerja merangkumi pelbagai jenis pengguna yang memerlukan taraf kefungsi dan capaian data ruang yang berbeza. Langkah kedua ditumpukan kepada kerjasama dan koordinasi yang akan memainkan peranan yang berkesan dalam setiap organisasi. Tidak ada organisasi yang boleh memperbaiki atau menyediakan NSDI sendiri kecuali ia saling bekerjasama diantara pelbagai institusi, organisasi kerajaan, sektor awam dan swasta dalam menjayakan pelaksanaan sistem NSDI yang berjaya. Jordan menggunakan dua sistem koordinat iaitu datum 'Palestin 1923' dengan unjuran Cassini-Soldner (CASS), dan unjuran terkini iaitu 'Jordan Transverse Mercator' (JTM). Sistem unjuran JTM adalah berdasarkan kepada datum 'International Hayford 1927'. Jabatan Tanah dan Ukur (DLS) bertanggungjawab menguruskan peta kadastral Jordan. Peta unjuran Cassini-Soldner merangkumi 17% Jordan dan peta unjuran JTM merangkumi kawasan-kawasan lain dalam negara Jordan. Sebahagian daripada kajian ini membuat perbandingan sistem unjuran CASS dengan JTM dalam usaha mencari kerangka rujukan yang boleh menyokong pembangunan infrastruktur data ruang (SDI) di Jordan. Dalam proses pelarasan transformasi afin menggunakan perisian ArcGIS, yang menukar unjuran CASS kepada kepada JTM, hasil yang diperolehi adalah pada ketepatan 10cm. Keputusan tersebut telah memberi dorongan kepada potensi peralihan kesemua peta dari unjuran CASS ke JTM. Menurut kajian ini juga, perselisihan di antara organisasi boleh dihapuskan apabila unjuran JTM digunakan sebagai sistem rujukan standard di Jordan.

# **DESIGNING THE NATIONAL SPATIAL DATA INFRASTRUCTURE FOR JORDAN**

## **ABSTRACT**

Developments in spatial data collection and usage play a pivotal role in developmental activities that perform Spatial Data Infrastructures (SDIs). SDI consist of the technologies, standards, policies (i.e. institutional frameworks), human resources (i.e. people) and organizational procedures to obtain store, process, distribute, and enhance the utilization of geospatial information. Knowing the SDI development status of other countries is essential to intensify the development and liability of spatial data information. In Jordan, there are many agencies, both public and private, that are concerned with spatial data production, use and sharing to meet the needs of the geo-information community. Jordan has no organizational framework, and there is an institutional void in leadership responsibility with regard to GIS. Most organizations prefer to create an independent national GIS committee and provide the committee authority, accountability, and legal mandate to manage all GIS works throughout the country. However, there are several challenges that NSDI might face in Jordan, such as interoperability issues, lack of funding, documentation of data, development of policies on data sharing, and national strategy. Since NSDIs are not identical worldwide (Cetl, Roić, et al., 2009), therefore it is important for Jordan to develops its own national strategy. On the other hand, there are many advantages like barring the duplication of spatial data, eliminating the redundancy of spatial data, raising the collaboration among organizations and different departments, improving the economic development at different levels. In creating the National

Spatial Data Infrastructure (NSDI) strategy, the first step is the awareness on the fact that most environments have various kinds of users who require different levels of functionality and access to spatial data. The second step is focus on the cooperation and coordination that play significant roles in each organization. No organization is able to improve or establish NSDI by itself unless it cooperates between various institutions, governmental organizations, public and private sectors that will lead to successful establishment of NSDI system. Jordan uses two coordinate systems namely the Palestine 1923 Datum, Cassini-Soldner projection (CASS), and the recent “Jordan Transverse Mercator” (JTM). The JTM Projection System is based on the “International Hayford 1927” Datum. The Department of Land and Survey (DLS) is responsible for managing the cadastral maps of Jordan. Maps in the Cassini-Soldner projection cover 17% of Jordan and maps in the JTM projection cover the rest of the country. Part of the study compares CASS with JTM projection system in Jordan in the effort to adopt suitable reference frame that supports the development of SDI in Jordan. In the affine adjustment process that transformed CASS projection to JTM in ArcGIS software, the result produces an accuracy of approximately 10cm. The result inspires the potentiality to transfer of all maps from CASS to JTM. Likewise, the study has shown that the discrepancies between organizations can be eliminated using the JTM projection as the standard reference system in Jordan.