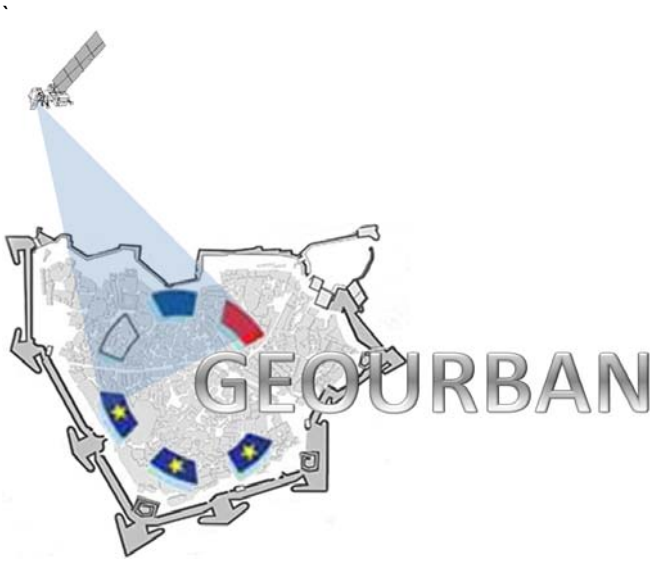
SEVENTH FRAMEWORK PROGRAMME
CAPACITIES - ERA.Net RUS: Linking Russia to the ERA

Contract for: **Innovation Project**

D.2
Urban planning requirements relative to EO



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Book Captains: Christian Feigenwinter
Eberhard Parlow

Contributors: Igor Penyevskiy
Guy Fleishman
Abraham Tal
Nektarios Chrysoulakis

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1. Introduction

1.1 Purpose of the document

This document is the deliverable D.2 of the GEOURBAN (ExploitinG Earth Observation in sUstainable uRBan plAnning & maNagement) project. It contains information about Workpackage 2 “Urban planning requirements relative to EO”. It documents the current understanding and the status of needs of urban planning and management that can be supported by EO data and methods. Further on, it documents the tasks that were undertaken in the frame of WP2.

1.2 Definitions and acronyms

Acronyms

CoP	Community of Practice
DSM	Digital Surface Model, high resolution building structure
DTM	Digital Terrain Model, moderate resolution topography
DW	Drinking Water
EO	Earth Observation
EC	European Commission
GEOURBAN	ExploitinG Earth Observation in sUstainable uRBan plAnning & maNagement
GIS	Geographical Information Systems
GW	Ground Water
HR	High Resolution
PM	Particulate Matter
SRTM	Shuttle Radar Topography Mission
UHI	Urban heat island
WP	Work Package
VHR	Very High Resoltuion
VOC	Volatile Organic Compounds

1.3 Document references

Barnsley, M. J. and Barr, S., 2000. Monitoring urban land use by Earth Observation. *Surveys in geophysics*, 21, 269 - 289.

Bhatta, B., 2010 : Analysis of Urban Growth and Sprawl from Remote Sensing Data. Springer, Dordrecht Heidelberg London New York, 172 p., ISBN 978-3-642-05298-9

Bojinski, S, et al., 2012. Aerosol mapping over land with imaging spectroscopy using spectral autocorrelation, *Int. J. Remote Sensing*, 25, 5025-5047

Christen, A., Coops, N., Kellett, R., Crawford, B., Heyman, E., Olchovski, I., Oke, T.R. and van der Laan, M., 2010. A LiDAR-Based Urban Metabolism Approach to Neighbourhood Scale Energy and Carbon Emissions Modelling. University of British Columbia, Canada.

Chrysoulakis, N., Abrams, M., Kamarianakis, Y. and M. Stanisławski, 2011. Validation of the ASTER GDEM for the area of Greece. Photogrammetric Engineering & Remote Sensing, 77, 157 - 165.

Chrysoulakis, N., Mitraka, Z., Diamantakis, E., González, A., Castro, E. A., San Josė, R. and Blecic, I., 2010. Accounting for urban metabolism in urban planning. The case of BRIDGE. In: CD-ROM of Proceedings of the 10th International Conference on Design & Decision Support Systems in Architecture and Urban Planning, organized by the Technical University of Eindhoven, in Eindhoven, The Netherlands (July 19-22).

Chrysoulakis, N., Vogt, R., Young, D., Grimmond, C.S.B., Spano, D. and Marras, S., 2009. ICT for Urban Metabolism: The case of BRIDGE. In: Wohlgemuth, V. Page, B. and Voigt, K. (Eds): Proceedings of EnviroInfo2009: Environmental Informatics and Industrial Environmental Protection. Hochschule für Technik und Wirtschaft Berlin, Vol. 2, pp. 183 – 193.

Damm, A. et al., 2010. Remote sensing of sun-induced flueorescence to improve modeling of diurnal courses of gross promary production (GPP). *Global Change Biology*, 16, 171-186

Dousset, B. and Gourmelon, F., 2003. Satellite multi-sensor data analysis of urban surface temperatures and land cover. *ISPRS Journal of Photogrammetry and Remote Sensing*, 58, 43 - 54.

EEA 2012: Urban adaption to climate change in Europe: Challenges and opportunities for cities together with supportive national and European policies. European Environment Agency Report 2/2012, ISSN 1725-9177, ISBN 978-92-9213-308-5, doi: 10.2800/41895

Ehret et al., 2008, Space-borne remote sensing of CO2, CH4 and N2O by integrated path differential absorption lidar: a sensitivity analysis, *Appl. Phys*. B 90, 593-608

Esch, T., Himmler, V., Schorcht, G., Thiel, M., Conrad, C., Wehrmann, T., Bachofer, F., Schmidt, M. and Dech, S., 2009. Large-area Assessment of Impervious Surface based on integrated analysis of Single-date Landsat-7 Images and Geospatial vector Data. *Remote Sensing of Environment*, 113, 1678 - 1690.

Frey, C.M. and Parlow, E., 2009. Geometry effect on the estimation of band reflectance in an urban area. *Theoretical and Applied Climatology*, 96, 395 - 406.

GEOURBAN D.1.1 Project Management Plan, 30/03/2012

Gruber, S. et al., 2003. Imaging spectrometry in high-alpine topography, the derivation of accurate broadband albedo. 3rd EARSeL Workshop on Imaging Spectroscopy, Oberpfaffenhofen, May 2003

Gupta, P. and Christopher, S.A., 2009. Particulate matter air quality assessment using integrated surface, satellite, and meteorological products: Multiple regression approach. *Journal of Geophysical Research*, 114, D14205, doi:10.1029/2008JD011496.

Heiden et al., 2007. Determination of rubust spectral features for identification of urban surface materials in hyperspectral remot sensing data*. Remote Sensing of Environment*, 111, 537-552.

Herold, M., Goldstein, N.C., and Clarke, K.C., 2003. The spatiotemporal form of urban growth: measurement, analysis and modelling. *Remote Sensing of Environment*, 86, 286-302.

Hipple, J.D., 2007. Assessment of risk in urban environments using geo-spatial analysis. In: Jensen, R.R. et al. (eds.), Geo-spatial technologies in urban environments. Springer, Berlin, Heidelberg. 240 p. ISBN-13 978-3-540-69416-8

Jensen, R.R and Binford, M.W., 2004. Measurement and comparison of leaf area index stimators derived from satellite remote sensing techniques. *International Journal of Remote Sensing*, 25, 4251-4265

Lang, S., Möller, M., Schöpfer, E., Jekel, T., Hölbling, D., Kloyber, E. and Blaschke, T., 2007. Quantifying and qualifying urban green by integrating remote sensing, GIS and social science methods. In: Müller, F., Jones, B., Krauze, K. Li, B-l., Victorov, S., Zurlini, G., Petrosilio, I. and Kepner W. (eds.): Use of landscape sciences for the assessment of environmental security. Berlin / New York: Springer, 93 – 106.

Lymburner, L., Beggs, P.J., Jacobson, C.R., 2000. Estimation of canopy-average surface-specific leaf area using Landsat TM data. *Photogrammetric Engineering and Remote Sensing,* 66, 183-191

Lu, D., Mausel, P., Brondizio, E. and Moran, E., 2004. Change detection techniques. *International Journal of Remote Sensing*, 25, 2365 - 2407.

Mitraka, Z., Chrysoulakis, N., Kamarianakis, Y., Partsinevelos, P. and Tsouchlaraki, A., 2012. Improving the estimation of urban surface emissivity based on sub-

pixel classification of high resolution satellite imagery. *Remote Sensing of Environment*, 117, 125 - 134.

Nichol, J.E., Fung, W.Y., Lam, K., Wong, M.S., 2009. Urban heat island diagnosis using ASTER satellite images and "in situ" air temperature. *Atmospheric Research*, 94, 276 - 284.

North, P., Grey, W., Heckel, A., Fischer, J., Preusker, R. and Brockmann, C., 2009. MERIS/AATSR Synergy Algorithms for Cloud Screening, Aerosol Retrieval, and Atmospheric Correction. Algorithm Theoretical Basis Document Land Aerosol and Surface Reflectance ATBD. ESRIN Contract No. 21090/07/I-LG.

PLUS 2012: Final report of the EU project “Planning urban security: Crime prevention through urban planning and development.” EC 2008 programme “Prevention Of and Fight Against Crime”. Available at www.plus-eu.com/downloads/Final-Report_english-german.pdf

POLIS 2010: Solar urban planning – manual of best practices. EC programme Intelligent Energy Europe. Available at www.polis-solar.eu/IMG/pdf/manual_polis_v2-2.pdf

Powell, R.L., Roberts, D.A., Dennison, P.E. and Hess, L.L., 2007. Sub-pixel mapping of urban land cover using multiple endmember spectral mixture analysis: Manaus, Brazil. *Remote Sensing of Environment*, 106, 253 - 267.

Ratti, C. & Richens, P., 2004. Raster analysis of urban form. *Environmental and Planning* B, 31, 297-309

Roberts, D.A. & Herold, M., 2004. Imaging spectroscopy of urban materials, in King et al. (eds.), Infrared spectroscopy in Geochemistry, Exploration and Remote Sensing, Mineral Assosciation of Canada, Short Course Series Vol. 33, London, Ontario, pp. 155-181

Robinson, D. & Stone, A., 2004. Solar radiation modelling in the urban context. *Solar Energy*, 77, 295-309.

Small, C. 2005. Global Analysis of Urban Reflectance. *International Journal of Remote Sensing* 26(4):661-681

Small, C., 2006. Comparative analysis of urban reflectance and surface temperature. *Remote Sensing of Environment*, 104, 168-189.

Sobrino, J.A., Jiménez-Muñoz, J., Soria, G., Romaguera, M., Guanter, L. Moreno, J., Plaza, A. and Martinez, P., 2008. Land Surface Emissivity Retrieval from Different VNIR and TIR Sensors. *IEEE Transactions on Geoscience and Remote Sensing*, 46, 316 - 327.

Taubenböck, H., Esch, T., Felbier, A., Wiesner, M., Roth, A. and Dech, S. 2012. Monitoring of mega cities from space. *Remote Sensing of Environment*, 117, 162 - 176.

Taubenböck, H., Goseberg, N., Setiadi, N., Lämmel, G., Moder, F., Oczipka, M., Klüpfel, H., Wahl, R., Schlurmann, T., Strunz, G., Birkmann, J., Nagel, K., Siegert, F., Lehmann, F., Dech, S., Gress, A. and Klein, R., 2009. Last-Mile preparation for a potential disaster – Interdisciplinary approach towards tsunami early warning and an evacuation information system for the coastal city of Padang, Indonesia. *Natural Hazards and Earth System Sciences*, 9, 1509 - 1528.

Toutin, Th., 2008. ASTER DEMs for geomatic and geoscientific applications: a review, International Journal of Remote Sensing, 29: 1855–1875.

Toutin, Th., 2001. Elevation modelling from satellite VIR data: A review, International Journal of Remote Sensing, 22:1097–1125.

Van der Linden, S. & Hostert, P, 2009. The influence of urban structures on impervious surface maps from airborne hyperspectral data*. Remote Sensing of Environment*, 113, 2298 - 2305.

Voogt, J. A. and Oke, T. R., 2003. Thermal remote sensing of urban climates. *Remote Sensing of Environment*, 86, 370 - 384.

Weng, Q., 2009. Thermal infrared remote sensing for urban climate and environmental studies: Methods, applications, and trends. *ISPRS Journal of Photogrammetry and Remote Sensing*, 64, 335–344.

Weng, Q., 2012. Remote sensing of impervious surfaces in the urban areas: Requirements, methods, and trends*. Remote Sensing of the environment*, 117, 34-49.

Wurm, M., Taubenböck, H. and Dech, S., 2010. Quantification of urban structure on building block level utilizing multisensoral remote sening data. In: *Proceedings of SPIE Europe Remote Sensing*, Toulouse 2010.

Wurm, M., Taubenböck, H., Schardt, M. Esch, T. and Dech, S., 2011. Object-based image information fusion using multisensor earth observation data over urban areas. *International Journal of Image and Data Fusion*, 2, 121 - 147.

2. Workpackage Overview

The main objective of WP2 was to document current understanding and the status of needs of urban planning and management that can be supported by EO data and methods. WP2 has two main directions: a) routine urban planning and management requirements (including requirements for natural disaster risk mitigation and urban security) and b) urban planning requirements for adaptation to climate change. To achieve this, the experience of the consortium partners in past projects, such as BRIDGE (Chrysoulakis et al. 2009, 2010), was exploited and a CoP (Community of Practice) was used. The output of this WP is the present deliverable D.2 on urban planning and management needs that can be met by using EO data and methods. WP2 interacts with WP3 and gives inputs to WP9. UNIBAS leads WP2; GRADI, GARD and FORTH will participate. WP2 consists of 3 tasks which are listed in the following Table 1.

Task	Title	Responsible institution
2.1	Documentation of the urban planning needs that can be supported by EO	UNIBAS
	- *Review of the current understanding of urban planning and management requirements*	*GRADI*
	- *Routine requirements*	*UNIBAS*
	- *Requirements for adaptation to climate change*	*UNIBAS*
2.2	Initiation of a CoP for stakeholders involvement for each case study	FORTH
	- *CoP meeting Basel*	*UNIBAS*
	- *CoP meeting Tel Aviv*	*GARD*
	- *CoP meeting Tyumen*	*GRADI*
2.3	Data collection in GEOURBAN case studies	UNIBAS

Table 1. *Tasks, subtasks and responsibilities in WP2.*

3. Documentation of urban planning needs that can be supported by EO

3.1 Review of the current understanding of urban planning and management requirements in the cities of the three GEOURBAN case studies

This section describes the organization, structure and management of urban planning authorities in the cities of the three GEOURBAN case studies. The main objectives of urban planning authorities and territory development management goals with respect to

- social, economic and space planning
- transport infrastructure planning
- engineering infrastructure planning
- evaluation of environmental restrictions in the course of urban planning

are listed in Table 2 in section 3.1.4. A short summary of main city characteristics (population, area, climate) and organization of urban planning is given in sections 3.1.1-3. Supplementary material and corresponding links are listed in Annex I.

3.1.1 TYUMEN (TY)

Population : city of Tyumen 580’000
Area : city of Tyumen 23’500 ha

Urban Planning in Tyumen is regulated by the Town Planning Code of the Russian Federation (RF TP Code) - being the basic legal rule in the field of town planning regulation. It describes the criteria providing safety and favorable living conditions, environmental protection, protection of cultural heritage facilities and specially protected national territories. Further on, decrees enacted by the Tyumen State Duma and the Administration of the Tyumen city provide the guidelines for city specific planning.

A city as a residential area is always included into municipal entity, thus it is necessary to follow the list of issues of local value in the course of determining a regulatory benchmark. This list is set in the Federal Law No 131-FZ dated October 6, 2003 "About the general

principles of the organisation of local government in the Russian Federation". Town planning documentation and town planning regulation documents make a normative basis for urban planning activities. For a detailed description of Tyumen city urban planning structures and requirements refer to Annex I.

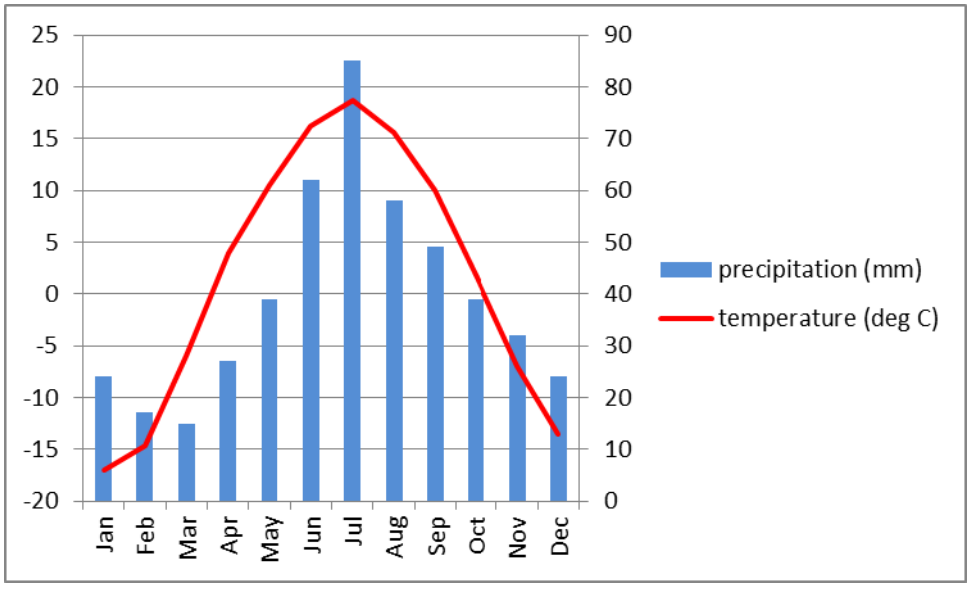

Figure 1: *Climate data for Tyumen (source worldweather.org). Mean annual temperature 1.5 deg C, annual total precipitation 457 mm.*

3.1.2 TEL AVIV (TA)

Population : city of Tel Aviv 404'000
Area : city of Tel Aviv 5'200 ha

The Master Plan of Tel-Aviv Yafo is based on the Strategic Planning approach. Strategic Urban Planning combines modern planning concepts with strategic management procedures, normally applied nowadays in the business world. It consists of a continuous cyclical process, involving: planning, implementation, monitoring and evaluation of programs, actions and urban projects, then going back full circle, when modifications are called for, in response to changing circumstances.

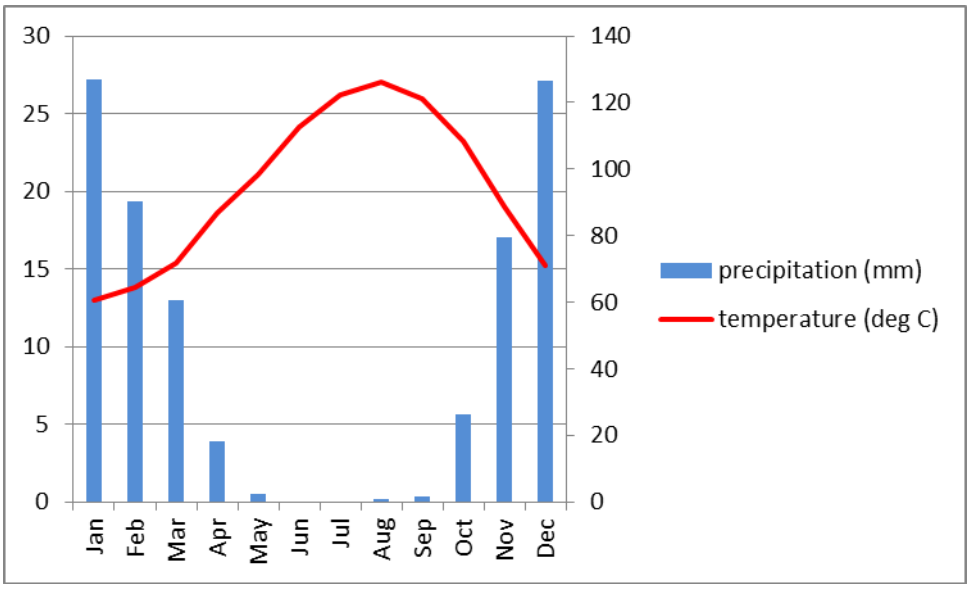

Figure 2: *Climate data for Tel Aviv(source Israel Meterorological Service): annual mean temperature 20.3 deg C, annual total precipitation 532 mm.*

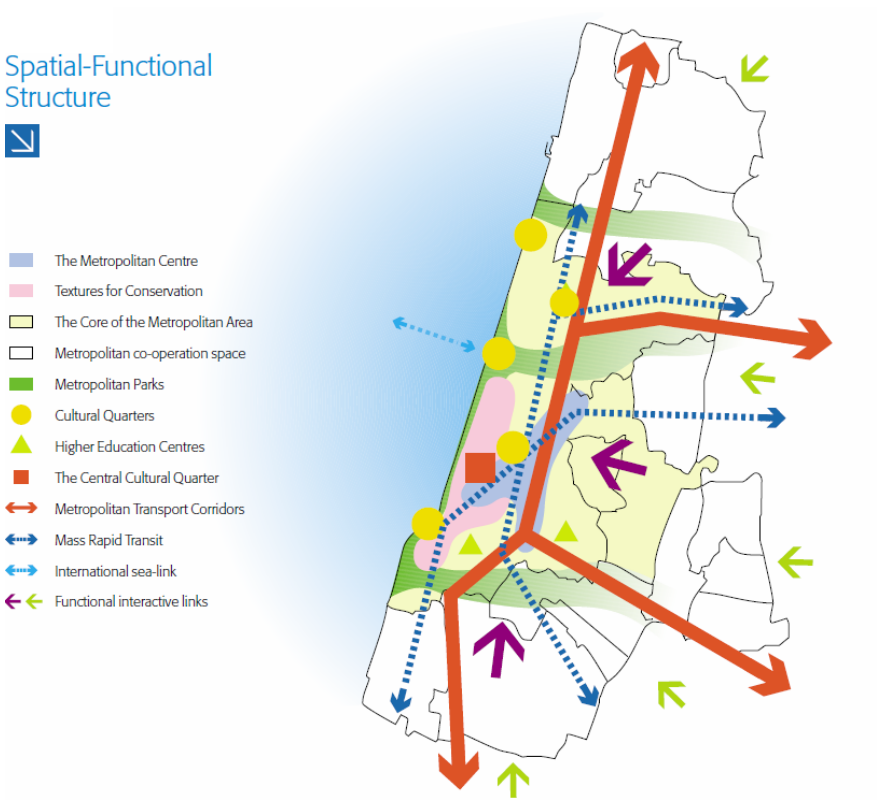

Figure 3: *Synthesis map for the Tel Aviv case study with the main features of spatial-functional structures.*

The Strategic Plan for Tel-Aviv Yafo is multi-disciplinary. It is concerned with all the city's facets - the social fabric, the economy, culture, leisure, land-use, the urban fabric, transport and the environment. The planning process involved is participatory. Residents and other stakeholders are invited to express their views regarding the city's current situation, identify problems and opportunities and

prioritize possible remedial courses of action. Later on, they are called upon to formulate their 'vision' for the city's future. The dialogue instigated by this process, helps to promote understanding among different interest groups, thus paving the way for consensus-building around specific issues.

Strategic Planning allows short-term and long-term 'Action Plans' to be brought forward, while the Strategic Plan is still in preparation. Early implementation of projects and programs arising for the Plan helps to build public confidence in its merits, whilst at the same time, strengthening the Municipality's problem-solving capacity. A built-in control and follow-up mechanism helps to assess the Plan's measure of success and ability to meet its pre-set objectives. The Strategic Planning process is open and transparent. The public can follow progress on the Municipal Website and through other media. For a detailed description of Tel Aviv city urban planning structures and requirements and the corresponding links refer to Annex I.

3.1.3 BASEL (BA)

Population : city of Basel 188’000 agglomeration: ca. 730’000

Area : city of Basel 3’695 ha agglomeration: ca. 48’200 ha

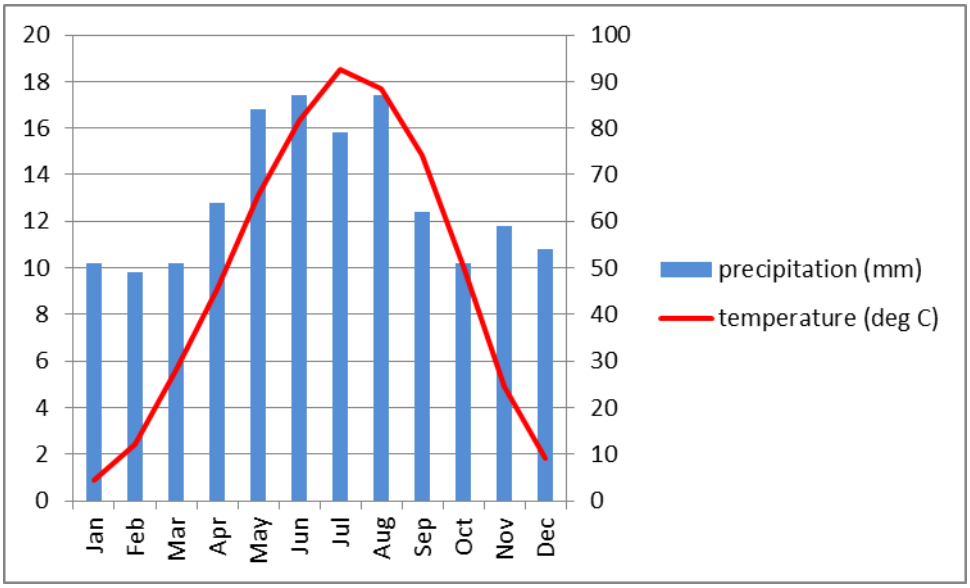

Figure 4: *Climate data for Basel (source: Meteo Schweiz). Annual mean temperature 9.6 deg C, annual total precipitation 778 mm.*

Urban planning in BASEL is mainly performed by three city agencies in three different departments. Each agency has its own specific field, but interactions, cooperation and communication are well developed.

The Agency of Cantonal and Urban Development (ACU) in the presidential department counsels and supports the government council in its task to observe and evaluate all significant developments in the city and the agglomeration and to coordinate and arrange the appropriate dispositions.

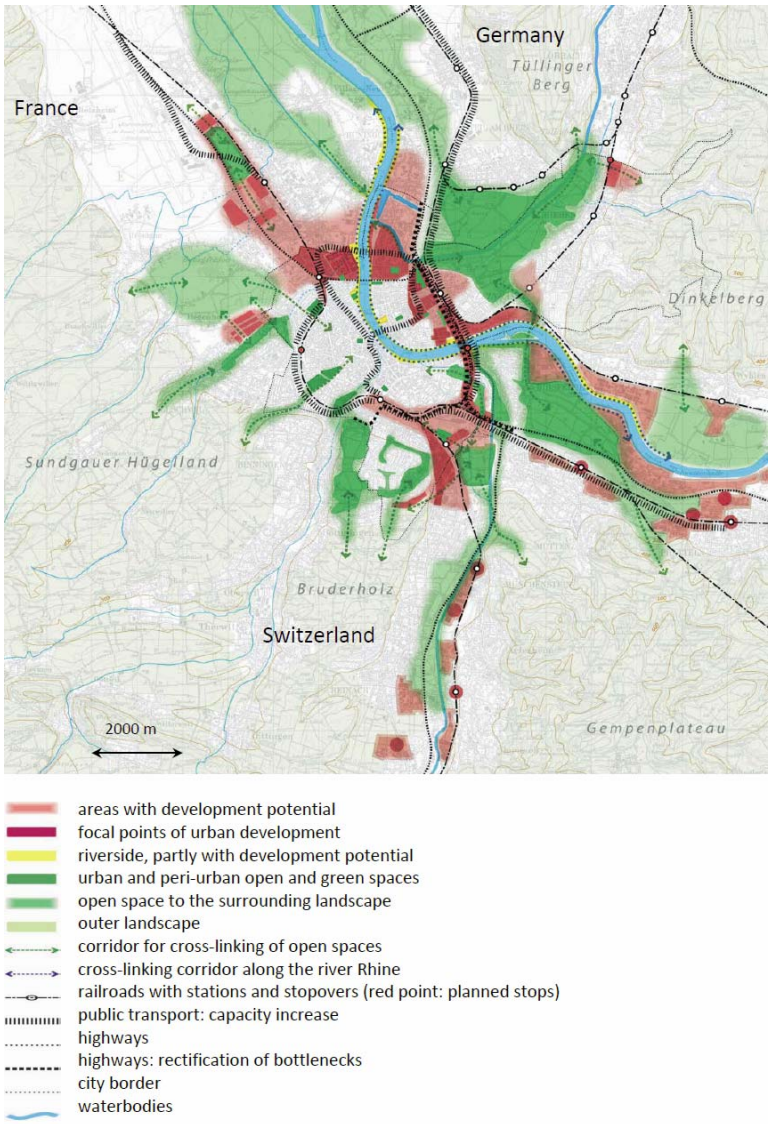

Figure 5: *Synthesis map for the Basel case study with the main features main features of the spatial development (extracted from structure plan).*

The Planning Office (PO) in the department of construction and traffic is responsible for urban and regional planning, for town construction and the projection in the public space and sphere. It manages the regional development plan and the zoning plan for the city of Basel, the future use of upcoming free areas and works out proposals for use and design of public plazas. In order to guarantee a future-oriented and sustainable urban development, the Planning Office is in close cooperation with the Trinational Eurodistrict Basel (TEB) as the representative of the surrounding towns in Switzerland, Germany and France.

The Agency for Environment and Energy (AEE) in the department of economic, social and environmental affairs is responsible for the protection of the population and the environment from harmful or disagreeable influences. It ensures that the existing resources are conserved, that water is used in moderation and propagates the avoidance of unnecessary waste and the use of renewable energies. The AEE is responsible for the compliance with air pollution and noise regulations.

Due to the special location of Basel right at the border to Germany and France (see also Figure 5), several international institutions were established with to aim to enhance communication and coordination of the local planning authorities. The municipal bodies of the trinational urban region of Basel realized, that a durable attractiveness of the economic and living environment and an appropriate infrastructure require a close cross-border cooperation. The Trinational Eurodistrict Basel (TEB) was thus founded in 2007 in order to coordinate regional planning activities efficiently across national borders. Meanwhile, TEB emerged as the forum, where important transnational questions are discussed and problems are solved by specific projects. The common objectives of regional planning for the agglomeration of Basel are defined in a paper on the development strategy 2020. At an operational level TEB particularly develops and deepens the transnational cooperation by binational and trinational initatives and projects. Based on a common long-term development strategy, TEB aims to reduce the negative impact of national borders and promotes to benefit from the diversity of the Basel region.

The basic requirements for general urban development and planning are defined in the guidelines for the legislation period 2009-2013. Here, the government council determines the mid-term and long-term strategies and emphasis. Another long-term (15-20 years) mandatory planning tool is the cantonal structure plan for the future spatial development.

Cantonal structure plan (Kantonaler Richtplan Basel-Stadt)

The Cantonal structure plan is the most important document concerning planning activities of the city of Basel. It is the mandatory instrument for planning authorities. With the strategy and the explanatory maps of the structure plan, the stage for the control of the spatial development of the next 15-20 years is set. Special focus is given to the relevant questions of settlement. Compact settlement is supported and preferred, new areas for

settlement and housing extensions are to be handled carefully and restrictive. Public transport and human powered mobility are highlighted as the preferred urban form of mobility. All planning activities have to be carried out considering the laws for the protection of waterbodies, nature and landscape. The cantonal structure plan enhances and completes the present planning instruments, namely the program for settlement and traffic in the agglomeration, the municipal structure plans and the planning of the Trinational Eurodistrict Basel. Figure 5 shows an example of a strategic map extracted from the structure plan.

Legislation plan 2009-2013 (Legislaturplan 2009-2013)

With the Legislation plan 2009-2013 the government council defines the mid-term and long-term key aspects according to the constitutional mandate, where a sustainable development and planning is explicitly regulated by law. The combination of quantitative observation and qualitative evaluation, as defined in the legislation plan, is the base for planning and coordination of the government council's actions.

3.1.4 Territory development management goals for GEOURBAN case studies

The main **territory development management goals** are compiled in the following Table 2. The underlying information was extracted from local guidelines, the relevant documents are linked in Annex I. Requirements that are relevant for all three or at least two case studies are highlighted. TY, BA and TA refer to case studies Tyumen, Basel and Tel Aviv, respectively.

№	Goals	Tyumen	Basel	Tel - Aviv
	Social, economic and space planning management goals			
1.	stable development of territories according to land-use planning	+	+	+
2.	creation of favorable conditions for gradual and complex development of territory	+	+	+
3.	developing of the long-term town planning strategy that will promote further stable social, economic, territorial and infrastructure development of the urban environment	+	+	+
4.	development and approvement of territorial planning documents in accordance with the general plan	+		
5.	detection of planning structure elements, defining parameters of planned development of planning structure, zones of planned location of facilities of federal significance, facilities of regional significance, facilities of local significance	+		
6.	establishment of developed land plots borders and non-developed land plots borders	+		
7.	enforcing the rights and legitimate interests of individuals and legal entities, including possessors of land plots and permanent facilities	+		
8.	creation of favorable conditions for investments attraction including the possibility to choose the most effective types of permitted use of land plots and permanent facilities	+		
9.	making decisions on conservation and withdrawal (including redemption) of land plots located on the territory of the urban district for governmental or municipal needs, transferal of the lands from one category to another	+		
10.	creation of facilities of federal significance, regional significance and local significance in accordance with territorial planning documents	+		
11.	gathering and exchange of information concerning population and territory protection from emergencies	+	+	+
12.	evaluation of environmental impact in the decision making process in respect of economic activities	+	+	+
13.	conducting construction process in accordance with land-use planning documents, land-tenure and development regulations, territorial planning documents	+	+	+
14.	supporting compact settlement, new areas for settlement and housing extensions are to be handled carefully and restrictive		+	
15.	controlling the spatial development of the next 15-20 years		+	
16.	the preferred urban form of mobility are public transport and		+	

	human powered mobility			
17.	regulating by law a sustainable development and planning	+	+	+
18.	making the combination of quantitative observation and qualitative evaluation as the base for planning and coordination of the government council's actions		+	
19.	observing and evaluating all significant developments in the city and the agglomeration and coordinating and arranging the appropriate dispositions		+	
20.	observing and coordinating current developments and processing the relevant information for the attention of the government council		+	
21.	exchanging experiences with other national and international working groups		+	+
22.	developing urban districts		+	
23.	creating equal opportunities for all citizens, including disabled persons		+	
24.	revision of the rates structure			+
25.	support of cultural institutions, organizations and individuals			+
26.	preparation of town planning schemes for employment areas, providing increased building rights, to encourage the supply of modern, well-equipped premises, as required by world class financial, business and high-tech enterprises			+
27.	active assistance to transport projects wholly funded by central government			+
28.	putting a control system to follow-up progress and ensure continuous improvement of the various services			+
29.	cooperation between the public and private sectors, as well as between them and the voluntary sector, to widen and improve the services rendered			+
30.	resolving the delivery issues surrounding the city's social strategic themed plans			+
	Urban territory development management goals in the field of engineering infrastructure			
1.	creation of engineering infrastructure schemes reflecting their current state	+		
2.	control of engineering systems development activities	+		
3.	defining the current state of engineering facilities	+		
4.	urban and regional planning, for town construction and the projection in the public space and sphere	+	+	+
5.	in order to guarantee a future-oriented and sustainable urban development, cooperating with the Trinational Eurodistrict Basel (TEB) as the representative of the surrounding towns in Switzerland, Germany and France		+	

	Territory development management goals in the field of transport infrastructure			
1.	evaluate street and road network and transport infrastructure facilities of the residential area	+	+	+
2.	detect the high-risk zones of transportation lines destruction subject to natural and anthropogenic forces	+		
3.	monitor unapproved construction of housing and industrial facilities in easement areas of railway and automobile roads as well as on the road shoulders	+		
4.	detect external processes and phenomena that can't be seen from the road, e.g. if they are hidden by forests, buildings and other objects	+		
5.	define extra places for parking	+		+
6.	reducing traffic congestion, with concomitant noise and air pollution, harming the quality of the environment			+
7.	eliminating illegal parking on pavements and on pedestrian crossings, reducing pedestrian safety and convenience			+
8.	reducing commercial unsightly signboards and other incongruous fixtures, leading to a serious defacement of buildings			+
	Territory development management goals in the field of environmental protection			
1.	detection of contaminated and derelict territories and control of recultivation activities	+		
2.	monitoring of environmental situation during construction of gas and oil production facilities, control of industrial emissions and effluents, control of industrial pollution of water areas and coast lines, control of engineering facilities operation	+		
3.	detection of territories with mineral deposits	+		
4.	defining square of landscape areas and condition of plants	+		
5.	monitoring of potentially hazardous areas of industrial territories	+		
6.	detection of processes which exacerbate occurrence of emergency on products pipelines and production areas	+		
7.	monitoring of floods, forest and tundra fires	+		
8.	control of water protection and sanitary zones borders during land allocation and timber cutting, control of proper use of land	+	+	+
9.	analysis of environmental changes resulted from natural and anthropogenic factors	+	+	+
10.	rational use and protection of water, land, air, mineral and power resources	+		
11.	protecting the population and the environment from harmful or disagreeable influences	+	+	+

12.	ensuring that the existing resources are conserved, that water is used in moderation and propagates the avoidance of unnecessary waste and the use of renewable energies		+	
13.	controlling air pollution	+	+	+
14.	protecting from noise	+	+	+
15.	diversion of hazardous waste and other problematic waste away from landfills		+	
16.	separating hazardous waste streams from non-hazardous waste streams		+	
17.	promoting the environmentally sound collection, treatment, transport, recycling, reuse or recovery and disposal of hazardous waste and other waste		+	
18.	reducing or avoiding harmful chemicals in products and substances		+	
19.	improving the information base essential to comply with the provisions of the Convention 2020, to improve control and prevent or combat illegal traffic		+	
20.	upgrading the public domain, in particular of enhancing the seashore			+
	Territory development management goals in the field of international planning			
1.	close cross-border cooperation in order to create a durable attractiveness of the economic and living environment and an appropriate infrastructure		+	
2.	coordinating regional planning activities efficiently across national borders		+	
3.	reducing the negative impact of national borders and promotes to benefit from the diversity of the Basel region		+	
4.	creating cross-border development projects		+	
5.	the international development and planning of traffic and settlements in the Basel region		+	

- the same goals in all cities - the same goals in two cities

Table 2: *Compilation of territory development goals.*

3.2 CoP meetings

Within task 2.2 of WP2 CoP meetings were organized by the local institutions of the respective case studies with support from FORTH. The outputs of the CoP meetings are of highest importance for the following sections 3.2 and 3.3 as well as for the definition of indicators in WP3 because they really reflect the current needs of practitioners in the near future but also in their everyday work. Table 3 presents an overview on the CoP meetings of the three case studies organized by the local institutions with the support by FORTH.

Case study	Date	Responsible institution
BASEL	1st CoP meeting 25 April 2012 presentations available on http://www.mcr.unibas.ch/typo3/index.php?id=209 2nd CoP meeting 7 June 2012	UNIBAS/FORTH UNIBAS
TEL AVIV	1st CoP meeting 16 May 2012	GARD/FORTH
TYUMEN	1st CoP meeting 23 July 2012	GRADI/FORTH

Table 3: *Schedule of CoP meetings*

The agendas, minutes and some presentations of the CoP meetings are available on the GEOURBAN exchange server or on the respective institution's websites as listed in Annex I. In the following the main outcomes of the meetings are summarized.

Case study BASEL: The planner's presentations revealed that the city authorities of Basel already have access to an excellent high resolution data base for a huge amount of parameters and indicators relevant for sustainable urban planning, management and development. The potential for additional input by the GEOURBAN project may therefore be modest and will be concentrated on VHR data. However, due to the specific location of the city of Basel at the trinational border of Switzerland, Germany and France and the joined efforts of the respective national planning authorities for a closer cooperation in the context of a sustainable development of the trinational metropolitan region, several issues concerning the acquisition of cross-border data were highlighted. Here, the activities of GEOURBAN are very welcome and a close cooperation for the future was substantiated at

the end of the meeting. In the second CoP meeting this cooperation was further deepened with the result of a common practical course for advanced students to be established in the upcoming winter semester 2012/13 with the aim of analyzing the spatial and settlement development in the greater Basel area. The discussion showed that indicators related to the EO-derived parameter "land cover" and all its derivatives (e.g. land cover change, fractional land cover, imperviousness, vegetation fraction, surface materials, etc.) are highly welcome as possible parameters for further development in the frame of the GEOURBAN information system. Other favorite indicators were related to building characteristics (building density/volume) and their temporal change as well as aerosol concentration. A preliminary indicator list was compiled which served as a base document for the CoP meetings in Tel Aviv and Tyumen.

Case study TEL AVIV: The participants represented the three sectors involved in urban planning in Israel – government, local authority and private sector. During the presentations, many questions were asked and discussed and the participants showed great interest in the potential contributions of EO and of GEOURBAN to their work. The users presented their organizations and the aspects of their work which are relevant to GEOURBAN. One important issue that raised during the meeting is the need for simulation software which would enable to evaluate the effects of changes in the urban environment during the planning stages. This is especially relevant for Tel-Aviv at this time since a new Master Plan is now in the process of being approved by the relevant committees and authorities.

Case study TYUMEN: Representatives of regional and municipal authorities, representatives of the largest universities of the region and representatives of business took part in this CoP meeting. Reports and presentations of the participants were devoted to a sustainable development of the city of Tyumen, a role of spatial/ environmental dimension in current urban planning practices in Tyumen, to potential of use of Earth Observation data for town-planning design goals, and also to support of city planning in the city of Tyumen. One of the main topics discussed at this meeting was the list of indicators of GEOURBAN as a required input to WP3. The first version of this list was established at the CoP meeting in Basel, updated at the CoP meeting in Tel Aviv and

finally discussed in Tyumen. Participants also argued about a better exploitation of EO in urban planning and made the preliminary list of indicators of GEOURBAN for Tyumen. For the Tyumen case study indicators with a high potential are: water surface temperatures and temperature change, land cover and land cover change, urban surface materials, surface albedo, surface emissivity, built-up density, fractional land cover, imperviousness/surface sealing, traffic (street and railway) networks and lines of communication. Of particular interest was also a group of ecological indicators, e.g. the availability of ground water and flood prevention.

3.3 Routine requirements (including requirements for natural disaster risk mitigation and urban security)

3.3.1 General remarks

As shown in section 3.1 and in the analysis of the CoP-meeting results, the three case studies exceedingly differ in terms of available resources (finance, manpower, data, etc.), hierarchical structure, legislation, autonomy, and general aims and guidelines for planning authorities at the different political levels (international, national, district, municipal). Also, the current use and the availability of EO data for urban planning institutions is differing from case study to case study. However, exploiting the possibilities of EO to support urban planning results in some key parameters that are important in general and for the three case studies in particular.

Case study BASEL: Use of EO data also depends on the available data base of planning authorities. In the case of Basel, the available information is already so detailed, that the routine use of EO data is limited to VHR data like aerial photographs and LIDAR data (e.g. annual update of the 3D city model). HR data are not used by city authorities, however, large interest in HR data was by claimed the trinational planning authorities TEB for urban and regional planning purposes.

Case study TEL AVIV: The local CoP meeting revealed great interest of the planning authorities in a simulation software for the evaluation of changes during planning stages with respect to the future Master Plan for Tel Aviv. EO data in Tel-Aviv relates to aerial photography and not to satellite imagery. There are several reasons for this. One is the

relatively small area of Tel-Aviv – 50 km^2. In reality this is the heart of the Dan Metropolis which has a total area of some 1500 km^2. However the metropolitan area is divided into 23 municipalities. There are some activities which are carried out by associations of the Dan municipalities in the areas of transport, sewage, solid waste, etc. but all planning is done separately by each municipality. So, with very high resolution aerial imagery and information from inspectors in the "field", they have all the information they need. Another obstacle to satellite imagery is the **2 m resolution limitation** practiced by all owners of high resolution satellites. There are however two areas in which satellite imagery could be used and that is the UHI using thermal imagery and ground subsidence using SAR imagery.

Case study TYUMEN: To date EO data only play a marginal role in terms of urban planning and city development. However, all participants of the CoP meeting showed great interest in a future use of EO data for urban planning as to be provided by GEOURBAN. It is expected that town-planning will be more effective with the support of EO data products also with respect of reflecting an existing situation and timely reacting to arising problems.

3.3.2 Routine requirements

The routine requirements listed in the following Table 4 were compiled combining the goals of urban planning institutions as formulated in the respective guidelines (section 3.1) and the outcome of the CoP meetings. The topics were selected considering the GEOURBAN main goal, which is the support of urban planning by EO data. **Topics that are unlikely to be supported by EO data are ignored.** The case study specific importance (need for action) of each topic is evaluated. In addition, we tried also to assess the different topics according to their potential (importance and feasibility) in the frame of the GEOURBAN project (last column of Tables 4 and 5).

o : not applicable

\+ : relevant

++ : very important / high potential

Sector	Topic (processes/mechanisms)	Action (adaptation and mitigation activities)	GEOURBAN indicators/parameters with relevance to EO	TA [1]	TY [1]	BA [1]	[2]
Air pollution and public health	Emissions by industry, traffic and domestic heating (NO_x, SO_x, CO, O_3, PM, VOC)	Reduction of emissions by technical measures, traffic regulations, toll roads, congestion charges, emission scenarios, low emission standards for vehicles, public transportation support systems, pollution monitoring, identification and care for vulnerable people	AOT, Surface topography (DTM), building structure (DSM), built-up density, population distribution as input for dispersion models and emission scenarios	+	+	+	+
Energy efficiency	Inefficient energy use as a main contributor to air pollution, UHI and thermal discomfort	Support of energy efficient systems for heating/cooling facilities, renewable energy production, building isolation, measures for CO_2 reduction	Building structure DSM , solar input	+	+	++	+
Water	Variable water availability due to inefficient use, out-dated infrastructure and environmental hazards	Renovation and optimization of water engineering infrastructures and water management, monitoring of Ground Water (GW) and drinking water (DW) availability, reduction of water consumption (“water saving culture”)	sea/water surface temperatures, and temperature change, land cover , land cover change	+	++	+	+
Transportation and mobility, accessibility	Conflict of interest between city authorities, policy, economy and private interests	Reduction of private traffic; support of public transportation and non-motorized traffic; toll roads; traffic restrictions by structural measures	Traffic (street and railway) network, lines of communication	++	++	+	++
Thermal comfort	Higher average temperatures in urban areas especially during the night compared to the rural surroundings (UHI)	Increasing the fraction of vegetated/green areas at the expense of impervious surfaces; increasing the fraction of shaded areas; reservation and clearing/creating of fresh air corridors; increasing surface albedo (“cool roofs”); sun shading of buildings and windows in order to decrease the storage of heat during daytime; planning, technical and construction measures	surface temperatures, urban surface materials, surface albedo, surface emissivity, built up density, fractional land cover, imperviousness/surface sealing		++	+	++

[1] need for action in the three case study cities TA (Tel Aviv), TY (Tyumen), BA (Basel) [2] GEOURBAN potential

Urban green	Reduced green and open spaces due to urban growth, environmental degradation due to increased urbanization	Conservation of urban green (parks, trees); increase of vegetated/green areas (e.g. vegetated roofs); urban farming	Land cover, urban surface materials, vegetation indices, fractional land cover	+	+	+	++
Territorial development	Settlement development, urban sprawl, industrial land consumption, urban land use, population growth	Forceful application of legislation and existing planning instruments; evaluation of potential areas for expansion; promotion of high-density housing	built up density, land cover, land cover change	++	+	+	++
Vulnerability to environmental hazards	floods/droughts, air contamination, fires, heat waves	Reduction of risk exposure; improvement of crisis management by (near) real time monitoring (e.g. Dresden 2002, New Orleans 2005); dispersion models; evacuation plans; early-warning systems; protection and accessibility of critical infrastructure; expansion/creation of flooding zones	Surface topography(DTM), built-up density (DSM), population distribution, input for dispersion models, critical infrastructure	+	+	+	+
Urban security	“social hot spots” caused by poverty, unemployment, disintegration and delinquency	Crime prevention; natural and artificial surveillance; integration programs for immigrants; consideration of security as a basic human need to be incorporated as an integral part of urban planning, design and architecture; creation of “defensive spaces”		+	+	+	o

Table 4: *Routine requirements*

[1] need for action in the three case study cities TA (Tel Aviv), TY (Tyumen), BA (Basel) [2] GEOURBAN potential

3.3.3 Requirements for adaptation to climate change

Cities are extremely vulnerable to extreme weather events which are expected to become more frequent and intense with the present climate change. Planning authorities at all political levels need to consider adaption and mitigation measures in order to make their city resilient against these impacts (EEA, 2012). Several topics referring to the future adaption of urban planning with respect to climate change are closely related to routine requirements, but will attract increased interest and significance with the ongoing climate change with its main expected impacts like the increased number of flooding/drought events, heat waves and water scarcity as the consequence of rising temperatures, changing precipitation pattern and sea level rising. The following Table 5 lists the most significant sectors, activities, priorities and their relevance to EO.

Sector	Topic (processes/mechanisms)	Action (adaptation and mitigation activities)	GEOURBAN indicators/parameters with relevance to EO	TA [1)]	TY [1)]	BA [1)]	[2)]
Marine and inland water ecosystems	Increasing water temperatures with negative influence on ecology, enhanced effect by use for cooling industrial facilities Flooding (river and coastal), droughts	Revitalization of water ecosystems; reduction of industrial heat input by technical measures; sustainable water management; reduction of waste-water amount	sea/water surface temperatures and temperature change, land cover, land cover change (floodwater, low-water)	+	+	++	+
Ground water (GW)	Increasing GW temperatures and decreasing GW regeneration with negative influence on GW quality and availability, changes of GW regeneration with changing precipitation patterns	Evaluation of the relevant anthropogenic and natural factors (e.g. by monitoring, modelling) and development of strategies for the solution of conflicts of interest; adaption of rules for construction and GW use	sea/water surface temperatures and temperature change, land cover, land cover change	+	++	++	+
Drinking water (DW)	Increasing extreme weather events and natural hazards (droughts, heat wave, heavy precipitation events causing floods and storm surge, etc.) have significant influence on the availability and the quality of DW	Technical measures (changing the location of DW abstraction); renovation and modernisation of water engineering infrastructures	Population distribution, land cover, land cover change	+	+	++	+
Buildings and infrastructure	High loss potential by floods, storms and hail damage due to high concentration of values typical for urban areas, increasing reinsurance costs	Use of storm/hail resistant construction materials and techniques; technical measures and renovation of water engineering infrastructures (natural and artificial); object protection	surface topography, built up density, urban surface materials, population distribution, critical infrastructure, accessibility, land cover, land cover change	+	+	++	+

[1)] need for action in the three case study cities TA (Tel Aviv), TY (Tyumen), BA (Basel) [2)] GEOURBAN potential

Urban climate	Urban heat island (UHI) intensity and heat waves are expected to increase in the future with high impact on urban climate	Increasing the fraction of vegetated/green areas at the expense of impervious surfaces; increasing the fraction of shaded areas; reservation and clearing/creating of fresh air corridors; increasing surface albedo ("cool roofs"); sun shading of buildings and windows in order to decrease the storage of heat during daytime; planning, technical and construction measures	surface temperatures, urban surface materials, surface albedo, built up density, fractional land cover, imperviousness/surface sealing		++	+	++
Air quality	Increasing temperatures will likely cause higher ground level Ozone concentrations	reservation and clearing/creating of fresh air corridors; reducing emissions of primary pollutants (NOx, VOC)	Surface topography (DTM), building structure (DSM), built-up density, as input for dispersion models	+	+	+	++
Health	Refer to urban climate and air quality. Increased heat stress and increased air pollution will mainly affect infants and young children, seniors, physically and/or mentally sick persons and socially isolated persons	Early-warning systems for heat waves, hazardous air contamination and industrial disasters; information about arrangements and behaviour-recommendations; special instructions and action plans for highly affected institutions (care and residential nursing homes, hospitals, schools) and people	Refer to urban climate and air quality	+	+	+	+

Table 5: *Requirements for adaption to climate change*

[1)] need for action in the three case study cities TA (Tel Aviv), TY (Tyumen), BA (Basel) [2)] GEOURBAN potential

GEOURBAN indicators/parameters with relevance to EO	Selected references
Surface topography (DTM)	Toutin (2001, 2008), Chrysoulakis et al (2011)
Building structures/density/volume	Ratti & Richens (2004), Wurm et al. (2010), Christen et al. (2010)
Land cover, land cover fraction, land cover change	Powell et al. (2007), Weng (2012), Dousset and Gourmelon (2003), Lu et al. (2004), Barnsley et al. (2000),
(Urban) Surface materials	Roberts & Herold (2004), Powell et al. (2007), Heiden et al. (2007)
Imperviousness, surface sealing	Esch et al., (2009), van der Linden & Hostert (2009)
Urban green, NDVI, LAI	Lang et al. (2007), Jensen & Binford (2004), Lymburner et al. (2000)
Surface temperatures	Voogt et al. (2003), Weng (2009), Small (2006), Dousset and Gourmelon (2003)
Solar input	Robinson and Stone (2004), POLIS (2010)
Emissivity	Sobrino et al. (2008) Mitraka et al. (2012)
Albedo, reflectance	Liang (2000), Lucht et al. (2000), Small (2005), Frey & Parlow (2009), Gruber et al. (2003)
Air pollution, GHG, aerosols	Ehret et al. (2008), Gupta and Christopher (2009), Bojinski et al. (2012), North et al. (2009)
Urban sprawl	Herold et al. (2003), Bhatta (2010)
population distribution	Wurm et al. (2009)
Risk and hazard assessment	Hipple (2007), Taubenböck et al. (2009)

Table 6: *Selected references for GEOURBAN indicators/parameters*

[1)] need for action in the three case study cities TA (Tel Aviv), TY (Tyumen), BA (Basel) [2)] GEOURBAN potential

3.4 Data collection in GEOURBAN case studies

The following datasets were uploaded to the recently established new GEOURBAN ftp-server (thales.iacm.forth.gr) for integration into the database. In a first step subsets covering 40x40 km^2 were chosen to keep the data consistent for further processing. The full scenes are partly uploaded, all full scenes are available at UNIBAS if required. To date, the uploaded material is considered as test data for the establishment of the relevant data bases (WP4, WP5, D.4, D.5). Figures 6 to 8 are examples for the 40x40 km^2 subsections for each case study. DLR provided TerraSAR-X data and derived urban footprints. This data collection is subject to permanent updating.

Case study	Sensor and date (MM/DD/YYYY)	Responsible	filename
TYUMEN	Landsat 5 TM 07/02/1984	UNIBAS	L5160020_02019840702
	Landsat 5 TM 08/14/2011	UNIBAS	L5160020_02020110814
	Landsat 5 TM 09/15/2011	UNIBAS	L5160020_02020110915
	Landsat 7 TM 07/28/2002	UNIBAS	L5160020_02020020728
	Landsat 7 TM 08/19/2010	UNIBAS	L7160020_02020100819
	TerraSAR-X	DLR	1_20111212165626 dims_op_oc_dfd2_370371880_3.tar.gz dims_op_oc_dfd2_370371880_2.tar.gz
	SRTM	UNIBAS	
BASEL	Landsat 5 TM 07/23/1984	UNIBAS	L5195027_02719840723
	Landsat 4 TM 06/30/1990	UNIBAS	L4195027_02719990630
	Landsat 5 TM 06/20/1995	UNIBAS	L5195027_02719950620
	Landsat 5 TM 08/12/2000	UNIBAS	L5195027_02720000812
	Landsat 5 TM 06/18/2006	UNIBAS	L5195027_02720060618
	Landsat 7 TM 07/15/2007	UNIBAS	L71195027_02720070715
	Landsat 5 TM 09/30/2009	UNIBAS	L5195027_02720090930

	Landsat 5 TM 08/19/2011	UNIBAS	L5195027_02720110819
	Landsat 5 TM 09/20/2011	UNIBAS	L5195027_02720110920
	Quickbird	UNIBAS	
	APEX 07/26/2010	UNIBAS	Spectral reflectance, broadband albedo, surface materials
	TerraSAR-X	DLR	1_20111212165626 dims_op_oc_dfd2_370371880_1.tar.gz
	SRTM	UNIBAS	
TEL AVIV	Landsat 7 TM 05/14/2003	UNIBAS	L71174038_03820030514
	Landsat 5 TM 08/26/2003	UNIBAS	L5174038_03820030826
	Landsat 5 TM 09/11/2003	UNIBAS	L5174038_03820030911
	Landsat 5 TM 09/27/2003	UNIBAS	L5174038_03820030927
	Landsat 5 TM 01/27/2009	UNIBAS	L5174038_03820090130
	Landsat 5 TM 02/03/2009	UNIBAS	L5174038_03820101203
	TerraSAR-X 12/12/2011	DLR	1_20111212165626 dims_op_oc_dfd2_370371880_4.tar.gz dims_op_oc_dfd2_370371880_5.tar.gz
	SRTM	UNIBAS	

Table 7: *List of EO data available on the GEOURBAN ftp-server (as of reporting date)*

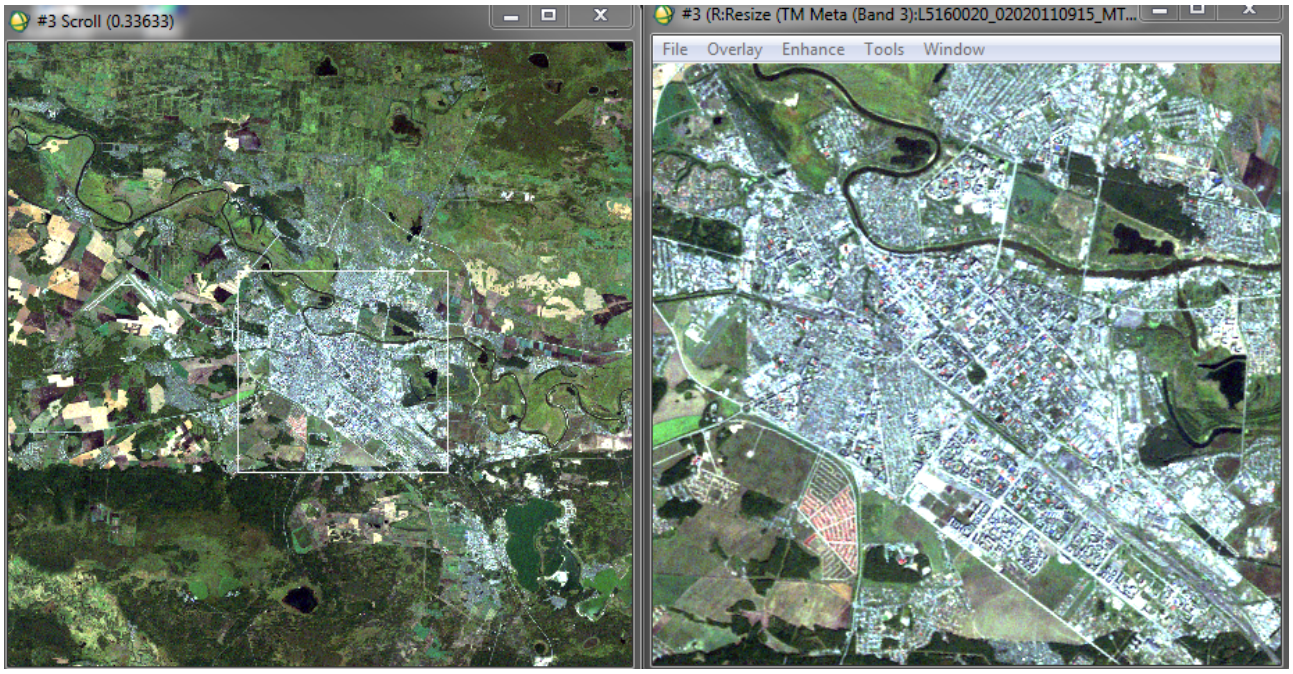

Figure 6: *Landsat 40 x 40 km subset (left) and city area (right) of the GEOURBAN case study Tyumen.*

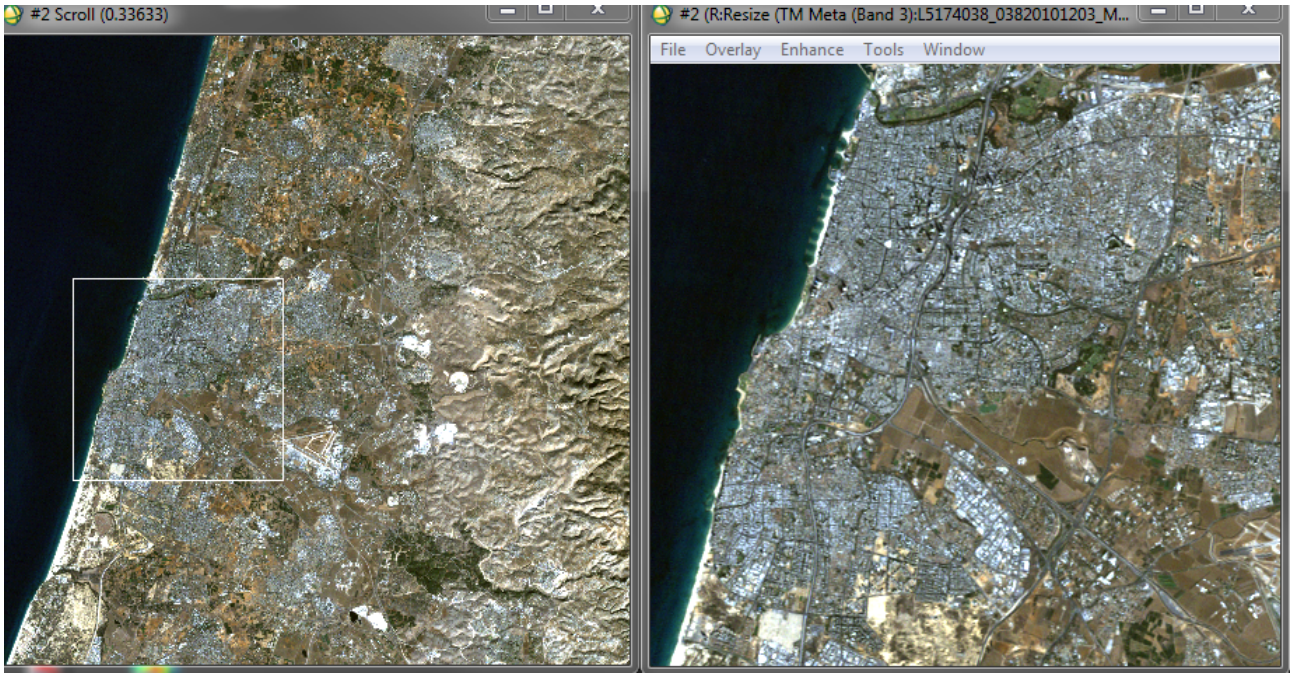

Figure 7: *As Fig. 6 but for GEOURBAN case study Tel Aviv.*

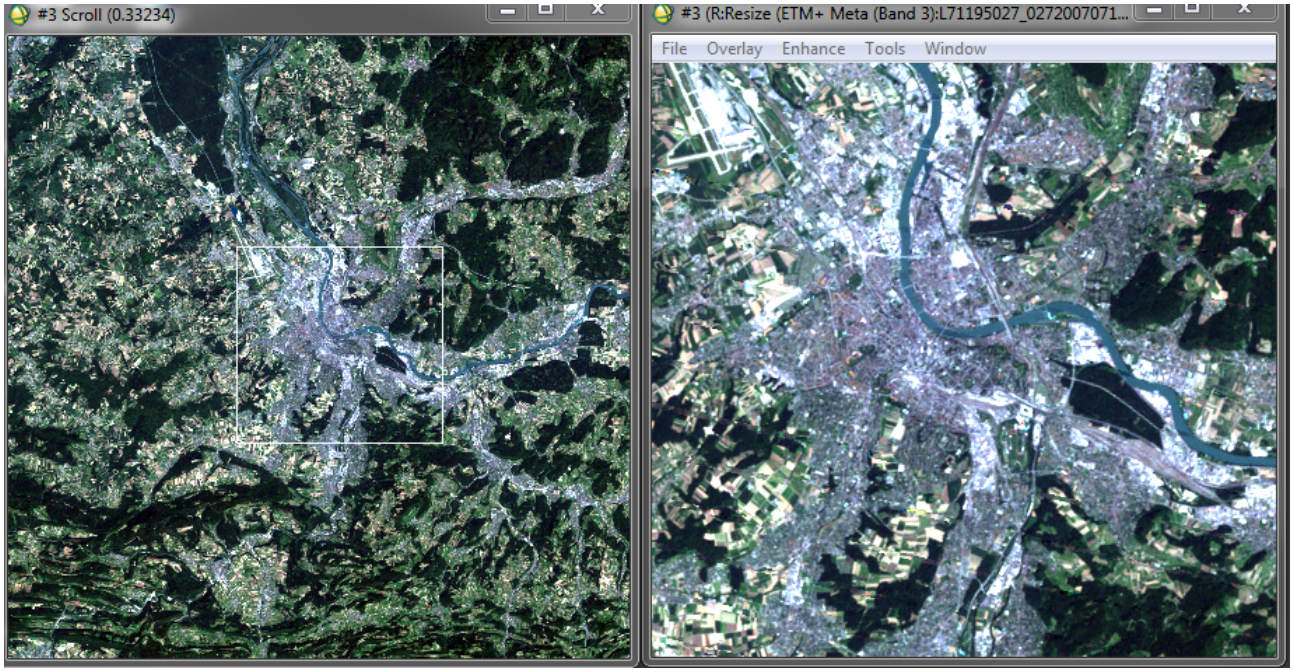

Figure 7: *As Fig. 6 but for GEOURBAN case study Basel.*

4. ANNEX I: Supplementary material for case studies

Planning authorities of the three GEOURBAN case study cities provide comprehensive documents and materials. The respective links are listed in the following for three case studies.

4.1 BASEL

Institution	Web address
MCR Meteorology, Climatology and Remote Sensing University of Basel, GEOURBAN project	http://mcr.unibas.ch/typo3/index.php?id=209
Agency of Cantonal and Urban Development	www.entwicklung.bs.ch
Planning Office in the department of construction and traffic	www.planungsamt.bs.ch
Agency for Environment and Energy (AEE) in the department of economic, social and environmental affaires	www.wsu.bs.ch/organisation/amt-fuer-umwelt-und-energie.htm
City of Basel Geo-Viewer (maps and orthophoto)	www.stadtplan.bs.ch/geoviewer/wms
The Trinational Eurodistrict Basel (TEB)	www.eurodistrictbasel.eu
SISOR-GISOR GIS platform	http://sigrs-gisor.org/
IBA Basel 2020	http://www.iba-basel.net/de/
AGGLO Basel	http://www.agglobasel.org/

References and documents

Bau- und Verkehrsdepartement des Kantons Basel-Stadt, 2009: Kantonaler Richtplan. *http://www.richtplan.bs.ch/richtplantext.pdf*

Präsidialdepartement des Kantons Basel-Stadt, 2010: Leitbild Kantons- und Stadtentwicklung.
http://www.entwicklung.bs.ch/leitbild_kste_2010.pdf

Präsidialdepartement des Kantons Basel-Stadt, 2010: Was ist Stadtentwicklung und wozu ist sie gut?
http://www.entwicklung.bs.ch/wasiststadtentwicklung_20100322.pdf

Regierungsrat des Kantons Basel-Stadt, 2010: Legislaturplan 2009-2013.
http://www.entwicklung.bs.ch/legislaturplan-2009-2013_2auflage.pdf

Trinationale Metropolregion Oberrhein, 2010: Gemeinsam handeln und gestalten: Eine Strategie für die Trinationale Metropolregion Oberrhein 2010.
http://www.eurodistrictbasel.eu/fileadmin/docs/1_Aktuell/Band%202_Internet.pdf

Deutsch-französisch-schweizerische Oberrheinkonferenz, Conference franco-germano-suisse du Rhin superieur, 2009: Kantons- und Regionalplanung im Oberrheingebiet, La planification régionale dans l'espace du Rhin Supérieur.
http://www.oberrheinkonferenz.org/media/documents/1144-Strategie+der+TMO_Dt.pdf

Trinationaler Eurodistrict Basel, 2009: Eine Zukunft zu dritt: Entwicklungsstrategie 2020 – Un Avenir à Trois: Stratégie de développement 2020.
http://www.eurodistrictbasel.eu/fileadmin/docs/1_Aktuell/Band%202_Internet.pdf

IBA 2020 Basel, 2009 : Auf dem Weg zur IBA Basel 2020 – Lancierungsphase 2009-2013
http://www.iba-basel.net/images/iba-basel/NEWS/iba_basel_2020_mission_statement_vers_d.pdf

4.2 TEL AVIV

Institution	Web address
Municipality of TEL-AVIV	www.tel-aviv.gov.il/eng/Pages/HomePage.aspx

References and documents

Municipality of Tel Aviv: Strategic plan: profile main issues
http://www.tel-aviv.gov.il/eng/AboutTheCity/Documents/Profile-main-issues-satrategic%20plan.pdf

Municipality of Tel Aviv: Strategic plan: Introduction
http://www.tel-aviv.gov.il/eng/AboutTheCity/Documents/Introduction-satrategic%20plan.pdf

Municipality of Tel Aviv: Strategic plan: strategic line 1
http://www.tel-aviv.gov.il/eng/AboutTheCity/Documents/Strategic-Line1-satrategic%20plan.pdf

Municipality of Tel Aviv: Strategic plan: strategic line 2
http://www.tel-aviv.gov.il/eng/AboutTheCity/Documents/Strategic-Line2-satrategic%20plan.pdf

Municipality of Tel Aviv: Strategic plan: strategic line 3
http://www.tel-aviv.gov.il/eng/AboutTheCity/Documents/Strategic-Line3-satrategic%20plan.pdf

Municipality of Tel Aviv: Strategic plan: strategic line 4
http://www.tel-aviv.gov.il/eng/AboutTheCity/Documents/Strategic-Line4-satrategic%20plan.pdf

Municipality of Tel Aviv: Strategic plan: Last Chapters
http://www.tel-aviv.gov.il/eng/AboutTheCity/Documents/Last%20Chapters-satrategic%20plan.pdf

4.3 TYUMEN

Institution	Web address
Tyumen city website (Russian)	http://www.tyumen-city.ru/

References and documents

Review of the current understanding of urban planning and management requirements in Tyumen
available on GEOURBAN project exchange server

Review of the current understanding of urban planning and management requirements in GEOURBAN case studies
available on GEOURBAN project exchange server