

Milestone Report 2009

**Overall Coordination of the Research Project:
“Climate and Energy in a Complex Transition Process towards
Sustainability in Hyderabad - Mitigation and Adaptation Strategies by Changing
Institutions, Governance Structures, Lifestyles and Consumption Patterns”**

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List of Abbreviations

ANGRAU	Acharya N. G. Ranga Agricultural University
AP	Andhra Pradesh
APCPDCL	Andhra Pradesh Central Power Distribution Corporation
APEREC	Andhra Pradesh Electricity Regulatory Commission
APFD	Andhra Pradesh Forest Department
APGENCO	Andhra Pradesh Generation Corporation
APMoUD	Ministry of Urban Development and Municipal Affairs, Andhra Pradesh
APNGC	Andhra Pradesh National Green Corps
APPCB	Andhra Pradesh Pollution Control Board
APSRTC	Andhra Pradesh State Road Transport Corporation
APTRANSCO	Andhra Pradesh Transmission Corporation
APUIFDC	AP Urban Infrastructure and Finance Development Corporation
BDI	Bundesverband der Deutschen Industrie e.V.
BEE	Bureau of Energy Efficiency
BMBF	Bundesministerium für Bildung und Forschung (Ministry for Higher Education and Research)
CATHY	Climate Assessment Tool Hyderabad
CCC	Center for Climate Change of the ESCI
CDM	Clean Development Mechanism
CESS	Center for Economic and Social Studies
CHATRI	Campaign for Housing and Tenurial Rights
CMS	Center for Media Studies
COVA	Confederation of Voluntary Associations
CSA	Center for Sustainable Agriculture
CULT-GEO	Institut für Kulturgeographie (Department of Cultural Geography, University of Freiburg)
DDS	Deccan Development Society
DLR	Deutsches Zentrum für Luft- und Raumfahrt (German Aerospace Center)
DRUM	Distribution Reform, Upgrades & Management – Programme set up by USAID and the Ministry of Power
DSDS	Delhi Sustainable Development Summit
ECM	Energy Conservation Mission
EPTRI	Environment Protection Training and Research Institute
ESCI	Engineering Staff College of India
EZ	Entwicklungszusammenarbeit (Development Cooperation)
FAPPCI	Federation of Andhra Pradesh Chambers of Commerce and Industry
FBH	Forum for Better Hyderabad
FSD	Forum for Sustainable Development, Hyderabad
GHMC	Greater Hyderabad Municipal Corporation
GoAP	Government of Andhra Pradesh
GRIHA	Green Rating for Integrated Habitat Assessment
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Association for Development Cooperation)
HACA	Hyderabad Agricultural Cooperative Association
HIA	Health Impact Assessment
HMDA	Hyderabad Metropolitan Development Authority
HMWSSB	Hyderabad Metropolitan Water Supply and Sewerage Board
HUDA	Hyderabad Urban Development Authority
IAD	Institutional Analysis and Development Approach

IBD	Information and Broadcasting Department
ICICI	Industrial Credit and Investment Corporation of India
ICRISAT	International Crop Research Institute for Semi-Arid Tropics
ICSSR	Indian Council of Social Science Research
ICT	Information and Communication Technology
IDEA	Infrastructure Development Enabling Act
IfG	Institut für Genossenschaftswesen an der Humboldt-Universität zu Berlin (Institute for Cooperative Studies at Humboldt University Berlin)
IFPRI	International Food Policy Research Institute
IGCC	Indo-German Chamber of Commerce
IGWDP	Indo-German Watershed Development Programme – Andhra Pradesh
IHK	Industrie- und Handelskammer (Chamber of Commerce & Industry)
IICT	Indian Institute of Chemical Technology
IIMA	Indian Institute of Management, Ahmedabad
INCAP	Infrastructure Corporation of Andhra Pradesh
IoE	Institute of Engineers
IoS	Institutions of Sustainability Approach
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producers
ITES	Information Technology Enabled Services
IWMI	International Water Management Institute
IYCN	Indian Youth Climate Network
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
JNTU	Jawaharlal Nehru Technological University
KfW	German Bank for Reconstruction and Development (Kreditanstalt für Wiederaufbau)
Lok Satta	A voluntary association or union
MACS	Mutually Aided Cooperative Society Act
MCH	Municipal Corporation of Hyderabad
MMTS	Multi-Modal Transport System
MNRE	Ministry of New and Renewable Energy, Government of India
MoEF	Ministry of Environment and Forestry
MoMAUD	Ministry for Municipal Administration and Urban Development
MoP	Ministry of Power, Government of India
MoRT	Ministry of Road Transport, Government of India
MoUD	Ministry of Urban Development, Government of India
MRTS	Mass Rapid Transit System
NABARD	National Bank for Agriculture and Rural Development
NASVI	National Association of Street Vendors of India
NEDCAP	Non-Conventional Energy Development Corporation of Andhra Pradesh Ltd
NEERU	Non Conventional Energy and Environment for Rural and Urban
NEXUS	Institut für Kooperationsmanagement und Interdisziplinäre Forschung (Institute for Cooperation Management and Interdisciplinary Research)
NGO	Non-Governmental Organisation
NGRI	National Geographic Research Institute
NIN	National Institute of Nutrition
ÖPNV	Öffentlicher Personennahverkehr (Public Transport)
PAP	Perspective Action Plan
PCB	Pollution Control Board
PIK	Potsdam Institut für Klimafolgenforschung
PMGER	People's Monitoring Group for Energy Regulation

PRAYAS	Prayas Energy Group
PRECIS	Providing Regional Climates for Impacts Studies
PTV	Planung Transport Verkehr AG (Traffic Mobility Logistics)
PUCAAR	People's Union for Civic Action and Rights
R&D	Research and Development
RCUES-OU	Regional Centre for Urban and Environmental Studies of Osmania University, Hyderabad
RESS	Fachgebiet Ressourcenökonomie, Humboldt-Universität zu Berlin (Division of Resource Economics, Humboldt University Berlin)
RTA	Road Transport Authority
RTE	Research Transport Economics
SANIHITA	Society for Women and Child Rights
SATYAM	Satyam Foundation
SCOTRWA	Standing Committee of the Tarnaka Residents Welfare Association
SDF	Sustainable Development Framework
SEAGA	Socio-economic and Gender Analysis Programme
SESI	Solar Energy Society of India
SEWA	Self Employed Women's Association
SME	Small and Medium Enterprises
SP	Systemic participation
SPSS	Statistical Package for Social Sciences
SRES	Set of Global Emission Scenarios
SRTRI	Swamy Ramananda Theertha Rural Institute
STP	Sewage Treatment Plant
TERI	The Energy and Resources Institute
TR2W	The Right to Walk Foundation
TRWA	Tarnaka Residents Welfare Association
UEM	Urban Energy Management
UFW	Unaccounted-for Water
UMTA	Unified Metropolitan Transport Authority
UoH	University of Hyderabad
USAID	United States Agency for International Development
WASSAN	Watershed Support Services and Activities Network
WCC	Womens' Consumer Cooperative
WP	Work Package
WSP-SA	Water and Sanitation Programme, South Asia of the World Bank Group
WUA	Water User Association
ZdK	Zentralverband deutscher Konsumgenossenschaften (German Association of Consumer Cooperatives)

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Potsdam Institute for Climate Impact Research (PIK)

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WP 2.1 Lifestyle Dynamics and Climate Change

Institute for Cultural Geography, University of Freiburg (CULT-GEO)

WP 2.2 Food, Nutrition and Public Health

WP 4.2 Health Systems

Division of Resource Economics, Humboldt University of Berlin (RESS)

WP 3.2.A Energy Management for the Emerging Megacity of Hyderabad

WP 3.2.C Food-Water-Environment-Nexus

Traffic Mobility Logistics (PTV)

WP 3.2.B Traffic Planning

Institute for Cooperation Management and Interdisciplinary Research (NEXUS)

WP 6 Participation and Communication Strategies

Berlin Institute for Cooperative Studies, Humboldt University of Berlin (IfG)

WP 4.1 Food and Nutrition

WP 7 Cooperation, Participation and Gender Dimension of Sustainability

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Introduction

The aim of the project is to achieve climate friendly and energy efficient development of the Indian Megacity of Hyderabad by transforming its institutions and governance structures (please see the description of project motivation contained in the original research proposal text, section 1.6). It is envisioned that, by the year 2030, Hyderabad will be one of Asia's „Low Emission Cities.—

The following Milestone Report is intended to serve two purposes. In the first place, it provides documentation of the progress and achievements made in the first year of the main phase of the project. In addition, this report is intended to demonstrate how various reviewer comments and suggestions – provided upon commencement of the main research phase by a general scientific peer-review committee and, in March 2009, during a visit to Hyderabad by the Chair of reviews committee of the project management agency (DLR) – have been, respectively, addressed and incorporated into the work of the research project. All of these comments and suggestions have been taken up in earnest by the consortium and our responses to them have been substantively incorporated within the work of the research project. Decisions regarding how to respond have been made collaboratively and the preparation of this report on those decisions, and their consequences for the research, has been a collaborative effort, with the final document being formally approved by all partners.

This report of the overall coordination of the Sustainable Hyderabad project is structured as follows: during a scenario development workshop in Hyderabad, in which Dr Koch-Kraft and Professor Dr Ehlers of the DLR were participating, questions were raised regarding the overall integrativeness and dovetailing of the various components of the project and also regarding its orientation toward climate change and energy efficiency. With these questions in mind, the first part of the report presents information concerning how the overall integration of the project is achieved and how this is related to the research-content focal points of climate and energy efficiency. Here the analytical steps and procedures employed in the research will be presented, in order to illustrate how the project „hangs together—both conceptually and operationally. As part of this elaboration, the various individual project Deliverables will be briefly described, in order to provide the detailed information required to follow the overall progress of the project. In particular, this section will highlight how the formulation of the research problem for the project makes it possible to engage concretely with the inherent complexity of the topic, facilitating reduction of this complexity into manageable individual research and implementation steps, work packages and cooperation agreements that can be effectively combined and integrated to give an overall assessment.

In addition, comments were made regarding the implementation orientation of the research and practical applicability of the research results. Since the successful implementation of results is viewed as central to the project, implications from this comment emerge in various forms through the course of the work. The Hyderabad project is intended to provide concrete, implementable results and express efforts have been made to ensure that the operational, institutional, economic, social and political practicability of the results are systematically conceptualised, planned and agreed upon in collaboration with the project's stakeholders. Although the concrete details of this process will be finalised in upcoming stages of the project work, a description of implementation strategy is provided here, in the second part of this report, following provision of a brief overview of the „Capacity Building— The stakeholder analyses carried out in the course of the previous year have contributed enormously to the elaboration of the project's implementation strategy. The initial strategies for achieving praxis-oriented implementation of the research results are presented below using stakeholder and partner maps. In addition, the wider salience of the research results, for use in other situations and innovation contexts, will be addressed. The report then finishes with a brief presentation of the project's communication strategy and its activities concerning project management, project evaluation and coordination with the other Megacities programme research projects and, in closing, the members of the project's scientific advisory board are presented.

Comments received from reviewers and associated reflections and responses of the project consortium constitute the central points around which further development of both the conceptual and methodological structures and the implementation strategies for the individual work packages (WP) has been based. In support of this presentation approach, each of the WP-related attachments accompanying this report contains a brief statement concerning the work of that package as it relates to the specific criteria outlined in the formal allocation-decision notification (hereafter the *Zuwendungsbescheid*) received from the DLR, German Aerospace Center. Each of the working groups within the project has in the last months intensively engaged with, reaffirmed and, where necessary, reformulated its conceptualisation of the fundamental elements of the research approach and the planned processes for ensuring implementation of project results, thereby engaging itself with, among other things: scientific rigor and the relevance of working hypotheses for practical levels of application; applied practice orientation, including both transposition of concepts into practical examples and the development of demonstration projects; incorporation and integration of local actors within the research project work; engagement with and the securing of commitments from relevant institutions and organisations; and measures toward Capacity Building (needs-based and focused on specific target groups). Also included in the individual WP-related attachments accompanying this report the main, additional outcome-oriented activities of each WP, which are not included among the project Deliverables, are listed. These additional activities facilitate and support the realization of the project objectives and serve to strengthen the research and implementation partners in the field in Hyderabad.

1 Project configuration and preconditions for collaborative work

The objective of the project is to bring the south Indian megacity of Hyderabad onto a development path that will enable it to become a leading „Low Emission City.— In order to effectively engage the research problematic associated with this task, it is necessary to analyse the local causes and causal chains as well as the specific local manifestations of the general problem. Meeting this objective requires that formal attention be given to the integration of observations associated with a variety of distinct thematic areas, among which strong interdependencies nonetheless exist. Because work carried out in practical application contexts always draws simultaneously upon multiple relevant forms and domains of knowledge, an analysis that is too segmented or too fragmented would not serve the praxis orientation and implementation goals of the research. Therefore, an integrative research approach and interactive project work process are needed in order to properly organise the work. The approach and processes developed for this project can be described as follows.

First, the general configuration of the project must be sketched out. The overall Hyderabad project is explicitly oriented around the main objective of engaging with the problematic of climate change and energy efficiency and is operationalised through practical engagement with three **cross-cutting issues**: *Impact paths: Temperature Change and Change in Water Availability & Rainfall Patterns, Lifestyle Dynamics, Greenhouse Gas Emission and Climate Change* as well as *Energy Management for Hyderabad*. These three cross-cutting issues engage, in turn, respectively, three thematic research areas: *Transportation, Energy/Water/Environmental Pollution* and *Food Supply and Health*.

After the general configuration of the project has been sketched out, its specific aims and objectives with respect to the areas of climate change and energy efficiency are described. In order to produce a consistent common work-process two minimum criteria must be met: a common *scenario development process* must be agreed upon and employed and a common Geographic Information System Database (*GIS-Database*) must be set up, the formatting and elaboration of which should be standardised on a project-wide basis. Within this structure the following methodological questions can then be addressed: how should the concrete

operationalisation of the work-process and the day to day running of the project look, so that the project objectives can be achieved? In the course of addressing this question, the appropriate allocations and special additional work-process designs for the respective cross-cutting themes will be outlined. The work-processes for the project are based on the fundamental analytical stages of the project research work which draft extensively on the results of the pilot studies of the preparatory phase (see www.sustainable-hyderabad.de / preparatory phase): *1. Background Studies, 2. Stakeholder Analysis, 3. Concept Papers, 4. Capacity Building, 5. Pilot Projects*. The central results of the work, which also constitute the key factors intended to induce change in the Hyderabad setting, will be brought to fruition through combination of the following two strategic elements.

- (1) To adjust the participative design of the institutional innovations made in the structures of both the formal and informal rules associated with the activity areas of climate and energy in such a way that the interactions between the involved actors are oriented toward serving the overarching goal. All things considered, there is always a substantive difference between „rules-in-form—and „rules-in-use— In order to speak of new rules being accepted, they must not only be developed but also adopted! It is only when new rules are put into practice that they can effect substantive changes in people’s behaviours (Hagedorn, 2002).
- (2) Rules, however, stay a blunt instrument for bringing about innovation, as long as its transformation into real behavior is not organised by adequate structures and mechanisms. (Hagedorn, 2008). How the latter of the two can be realised is best tested and demonstrated through concrete trial and error. It is to this end that the customised reforms of the governance structures and modalities in Hyderabad, through which the desired institutions are to become effective, need to be designed. These reforms are being researched by the project partners through collaborative pilot projects and are being explicitly facilitated through capacity building work with both project and praxis partners.

The objective of this first part of the Milestones Report is to elaborate how the project, as a coherent single entity, is related to and underpins the selection and prioritisation of the key functional expected outcomes of the work. In order to illustrate these relationships, in Tables 1-8 (below) the specific linkages between the individual Deliverables associated with each of the Work Packages and the current project Milestones are indicated. In addition to this, additional information is provided regarding how the work of each Deliverable is taken up within the overall work processes of the project and regarding which roles each Deliverable plays within these processes. Also within this presentation frame, the planned pilot projects are sketched out and their potential for upscaling and practical applicability will be addressed. In light of the fact that the pilot project work will begin after the work of the outputs from the Background Studies, Stakeholder Analyses and Concept Papers stages of the research have become more concrete, these sketches and assessments should not be viewed as final specifications. Up to now, the project partners have completed the Stakeholder Analyses and Background Studies stages of the work. The associated completed Deliverables will be made available to DLR online, serving thereby as the basis for an open and creative scientific exchange of ideas regarding the implementation of this project.

1.1 Configuration of the Project

Activities associated with the all three of the thematic areas contribute significantly to greenhouse gas emissions (GHG-emissions) because changes in lifestyle are, in large part, causes for the increases in GHG-emissions seen in Hyderabad. This problem is exacerbated by the fact that the impact chains (consumption & production changes) imbricated with the activity areas associated with these lifestyle changes are underpinned by very inefficient and greenhouse-gas-intensive energy supply and distribution structures. In three figures – one for each of the thematic areas – these impact chains are depicted (see Annex 1 - *Lifestyle impacts*

on transportation & infrastructure systems and related emissions, Lifestyle impacts on water, energy, industries and related emissions, Lifestyle impacts on food and health systems with related emissions). All three sub-systems are also affected by climate change impacts, and three further figures – focused explicitly on Hyderabad – point out these impact pathways in detail (Climate impacts on transport and agriculture, Climate impacts on food and health, Climate impacts on water, energy and health).

In order to do justice to the causal complexities of the research topic and the thematic focus on climate change and energy efficiency the project has been configured in the following manner (see Figure 1). There are three cross-cutting issues:

- Impact Paths: Temperature Change and Change in Water Availability & Rainfall Patterns
- Lifestyle Dynamics, GHG and Climate Change
- Energy Management for Hyderabad

These issues are treated by all project areas in a different, complementary manner in the framework of a research approach that aims at achieving climate mitigation and adaptation as well as energy efficiency by changing institutions and governance structures (second bottom cross-bar, Figure 1). Sustainable development is the guiding principle of the project, which is symbolized by the bottom cross-bar. Based upon close collaboration with the Indian partners and stakeholders, the project is working through the following analytical steps:

1. The thematic and cross-cutting WPs develop Background Studies, Stakeholder Analyses and Concept Papers,
2. which are then to be implemented, in conjunction with the consolidated findings of process-oriented WPs in an associated Capacity Building process and,
3. as a result of an integrated dissemination, policy advice and publication strategy, should give rise to enduring and practicable results.

The analytical steps have been elaborated in detail in the original project application (see section 2.4).

1.2. Supporting Components of the Collaboration: Scenario process and project-wide database

1.2.1. *The Scenario Process: Standardised methodological procedures, complexity reduction and complexity management*

Climate change and energy efficiency are exemplary cross-cutting thematics. Therefore, a precondition for collaboration between the WPs (particularly between the German and Indian partners) is a well coordinated methodological procedure for identifying the particular strategy options and development lines to be pursued in the project. The content-laden framework for action, which specifies the conditions for collaboration between the WPs, is the context within which the standardised scenario building process for the project is conceptualised. Through the development of a reference scenario, a baseline status quo referent is formulated, based on data concerning production and consumption, investment and finance, governance structures, property rights, environmental impacts, capital flows, im- and emigration, lifestyle and key areas of social and cultural tensions. This reference scenario then provides the referential basis for the identification of climate impacts and inefficient energy usage.

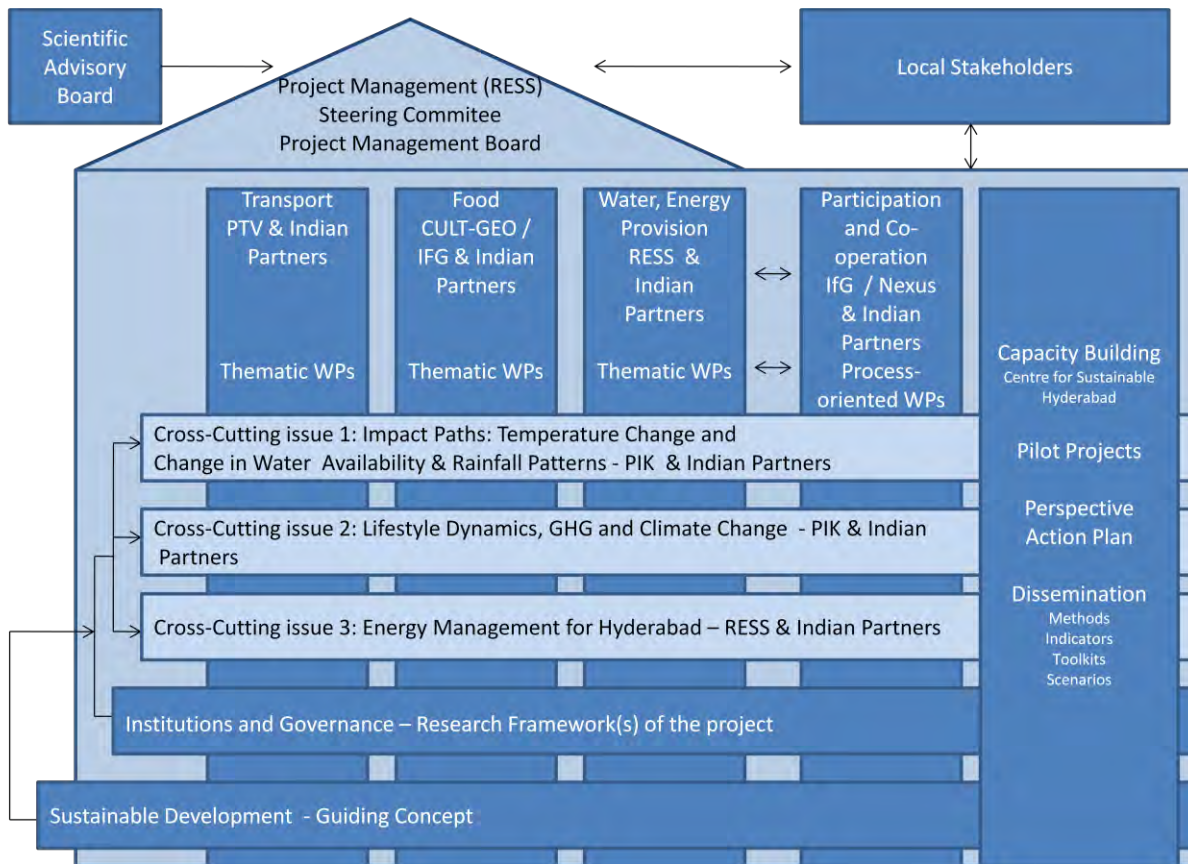


Figure 1. Overall Configuration of the Project

Following an intensive preparation period, this process had its operational debut at the scenario workshop that took place between 28th February and 2nd March 2009 in Hyderabad, where the stakeholder and research partners worked together to create thematic matrices containing the relevant indicators and intervention points that need to be taken into account for the project (the participant list and the programme can be found on this website: www.sustainable-hyderabad.de). Already with this workshop it became possible, employing a shared discussion process, for the project participants to identify the operative causal interlinkages within the problem space, making the focus on potential key emission reduction pathways explicit and, thereby, enabling the group to whittle down the substantial number of possible indicators and intervention points, in order to concentrate attention onto the most important ones – making it possible to reduce the overall complexity of the problematic. Starting with approximately 80 indicators and 60 intervention points, only 20 indicators and 15 intervention points have been selected, as they are the ones that reflect climate and energy efficiency. Based on this compression process, three development scenarios have now been formulated: a *reference scenario (A)*, a *sustainability scenario (B)* and a *worst-case scenario (C)*. The sustainability scenario describes a climate friendly growth strategy for Greater Hyderabad, up to the year 2020, which is to be consolidated in conjunction with social development and the consequences of social development. The recently commenced scenario development process will continue in the coming months, making it possible to develop the standards that will be required in order to carry on with a common and consistent project course. The preliminary results of this first stage of scenario development work are due to be presented in a session at the 2009 Megacity Conference to be hosted by the Helmholtz Center for Environmental Research, in Leipzig.

1.2.2. Project-wide GIS Database

In order to develop the scenarios, a comprehensive and compatible set of data and information resources will be required. As can be seen in the original project application (see section 2.4.3), a project-wide GIS-Database is to be set up, comprised of data provided from all of the individual WPs and administered through WP 3.1. Stipulation of the most essential data – including, topographical information and maps, land-use information and associated geographical maps, and demographic and population distribution information – and also of the methods to be used for ensuring the compatibility of the different types of data gathered to address various research questions (e.g. concerning how to develop a common structure for storing all socio-economic related data), will be made through the workings of a special Database Working Group, in which all partners will participate, since this information will be relevant for all components of the project work. Information concerning the configuration of a population within a specific area is, for example, every bit as important for specifying a climate friendly transportation system as it is for developing energy-efficient energy and food supply distribution systems. At the start of the new milestone year (July 2009), final questions will be addressed, such as uniform spatial division of the territory for data acquisition.

1.3. Concrete Objectives to be served by the Sustainability Scenario

In spite of a persistent and marked underclass (including the large population of genuinely poor people) the most notable trend in the changing lifestyle of India's population is the growth of its middle classes: households with a monthly income of about € 300-1,400 (Fernandes 2006; Jaffrelot and van der Veer 2008; James 2000). In 2005 approximately 5% of all Indian households could be classified as middle class; in 2015 that number is predicted to be 20% and in 2025 it is predicted to rise to 40% (MGI 2007). Accordingly, the demand for energy, goods and services, transportation capacity and services and foodstuffs will increase – not only as a result of an absolute increase in population, but also and primarily through changes in consumption practices and lifestyles; a quadrupling of consumer spending is expected to take place during the period up to 2025. Technical improvements in the efficiency of individual devices or services, which may be achieved during this period, run the risk of being overshadowed by the expansion of consumption that will be generated by these changes in lifestyle. In addition, due to a heavy reliance upon coal-fired power plants, the currently foreseeable expansion in demand for electricity will inevitably also lead to and increases in India's average annual per household CO₂-emissions (Pachauri and Jiang 2008).

With respect to mitigation strategies, the anticipated increase in GHG-emissions will need to be absorbed by the introduction of still further additional energy efficiency enhancement measures as well as through shifts to more climate friendly lifestyles. With a projected population of approx. 13 mil. residents expected in 2021, potential GHG-emissions for India range between 13.3 mil. t CO_{2eq}/a. (*scenario A: with a constant per capita emission rate of 1.02 t/a.*), 28 mil. t (*scenario B: reference scenario, with an increase to around 2.15 t/(cap*a.)*) and 46.8 mil. t (*scenario C: which presumes that India will be, in 2021, the way China is today, giving it a per capita emission rate of 3.60 t/a.*). It is expected that with the scaling up of all the planned pilot projects to the city level, a maximum energy saving of circa 30% is possible (sustainability scenario as opposed to the reference scenario = scenario B) (cf Shukla et al. 2008). One of the goals of the project is, therefore, to ascertain what would be appropriate policy-mixes, and more specifically to identify a coordinated combination of technical measures, political instruments, governance reforms and institutional innovations that can lead, via their implementation throughout the entire project study area, to the required savings. Alongside this outcome oriented focus on the energy sector (decarbonising) there are also other areas of activity that need to be kept in the picture, where, among other things, a reduction, curtailment or

constrained rate of growth will be required, depending upon the degree of energy efficiency and overall sustainable development targeted for the metropolitan area.

With respect to adaptation strategies, together with the planning authorities in Hyderabad, efforts are underway to develop an appropriate and efficient response to the locally manifesting workings of climate change. At the end of the project, technical measures, political instruments, governance reforms and institutional innovations which can make an increase in adaptive capacity possible, especially among those whose prospects for being able to adapt are the poorest, will be conceptualised and demonstrated. Here, the development of the Climate Assessment Tools for Hyderabad (CATHY), a computer-supported spatial analysis tool, plays an important role, because it makes comparison between the regions of Hyderabad possible, both within and across the research topic areas of the project. In this way, local and regional climate effects can be compared with each other quantitatively, the effectiveness of adaptive measures and their urgency can be assessed and suitable adaptation strategies can be legitimated within the political process.

1.4. Day to Day On-the-Ground Collaboration: Description of the working processes dedicated to setting out the „Sustainability Scenario—

The common scenario building process and the cross-project database are preconditions for carrying out the project work in a targeted, methodologically compatible and, most importantly, coherent manner that serves not only the letter but also the spirit of the specified research objectives. Similarly, this wider scenario building process is to be drawn upon within the project-level work processes. Below a graphic is provided illustrating how the work processes are organised in order to reach the sustainability scenario. In Figure 1 (above) the categories thematic WPs, process oriented WPs and cross-cutting issues were used, which span across the various working areas covered under the 10 Work Packages of the project (see original application, section 2.4) whereas, in Figure 2 (below), additional detail is provided, in order to indicate how the individual WPs are distributed across the overall structure of the project and how they are organised with respect to the above mentioned cross-cutting Issues. The individual WPs will be described here briefly, using the short-hand *cross-cutting WPs*, *thematic WPs* and *process-oriented WPs* and the actual work processes will be presented through reference to the associated goal-oriented cross-cutting issues: *Impact Paths: Temperature Change and Change in Water Availability & Rainfall Patterns, Lifestyle Dynamics, GHG and Climate Change and Energy Management for Hyderabad*.

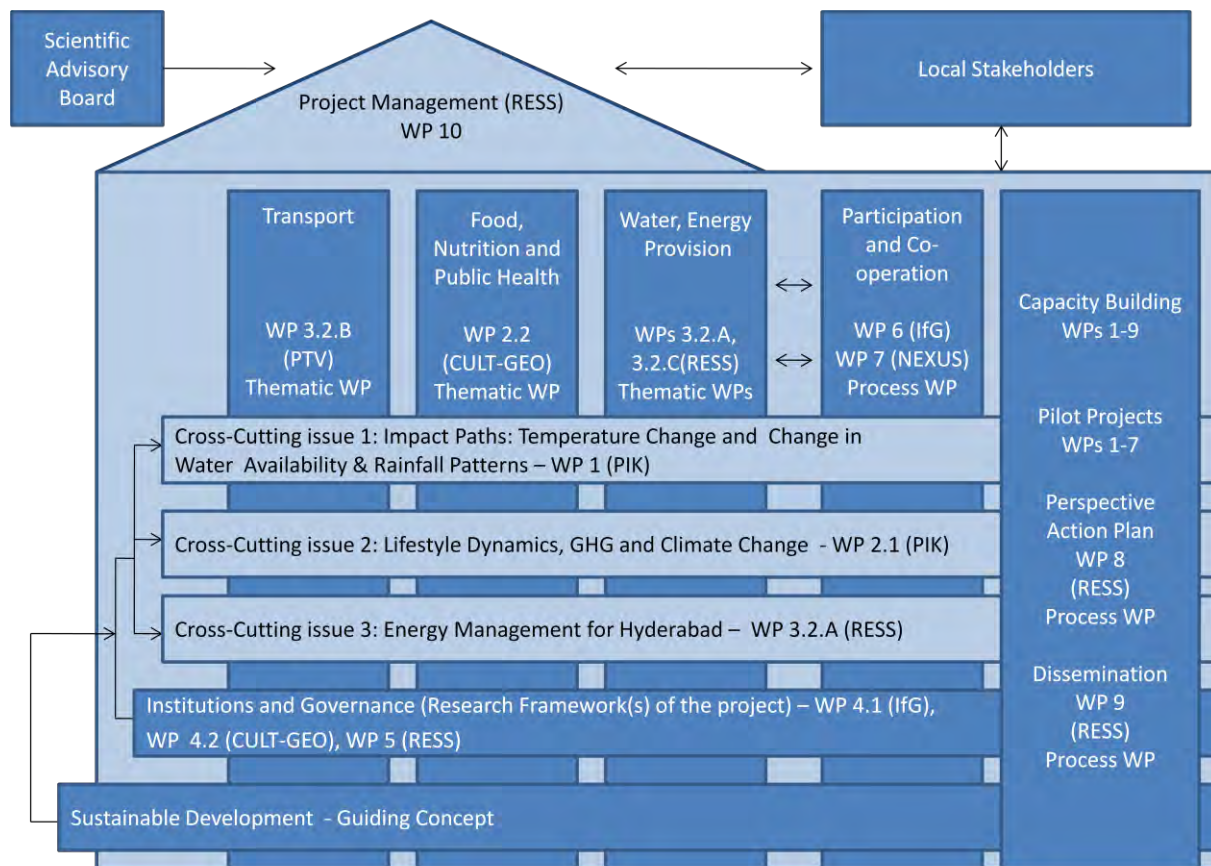


Figure 2. Overall Configuration of the Project according to WPs

1.4.1. Cross-Cutting Work Packages

The cross-cutting issues have two integrative, relationship-structuring functions. First, they provide important climate relevant information for the thematic WPs (for example, concerning changes in temperature, lifestyle related patterns of consumption and energy usage structures), which is needed in order to draft a climate friendly concept consistent with the research approach of the project (Knowledge Transfer Function). Second, they have a calculation and evaluation function, meaning they provide data that is required for carrying out the assessments concerning the GHG-reduction and sequestration potential of the adaptation measures to be pursued under the pilot projects as well as for assessing the extent to which these may or may not change if and when the pilot project is upscaled. This makes it possible to develop precise measurement categories relating to the attainment of the sustainability scenario and improves the ability of the actors to make discerning choices regarding which instruments and institutions to develop.

Towards this aim, WP1 calculates the gains to be made through climate change adaptation measures. In the area of climate change mitigation and energy efficiency there is a close collaboration and coordination of the cross-cutting WPs Energy Management for Hyderabad and Lifestyles, GHG (Greenhouse Gases) and Climate Change While WP 3.2.A calculates the energy usage effects in kWh, WP 2.1 does the same for GHG-emissions, in order to obtain suitable categories for monitoring, on the one hand, inhibition of GHG-discharges and, on the other, energy efficiency increases. This differentiation is in any case necessary, because WP 3.2.A is concerned primarily with energy in the form of electricity, whereby WP 2.1 is concerned

mainly with GHG-emissions arising from, for example, the use of kerosene, wood and diesel based energy sources (e.g. for cooking) – which pertain to around 30% of Hyderabad’s population, i.e. circa 2.1 mil. residents. Each thematic, process oriented and cross-cutting WP is intended to make a substantive, quantitative, measurable contribution toward achieving the sustainability scenario.

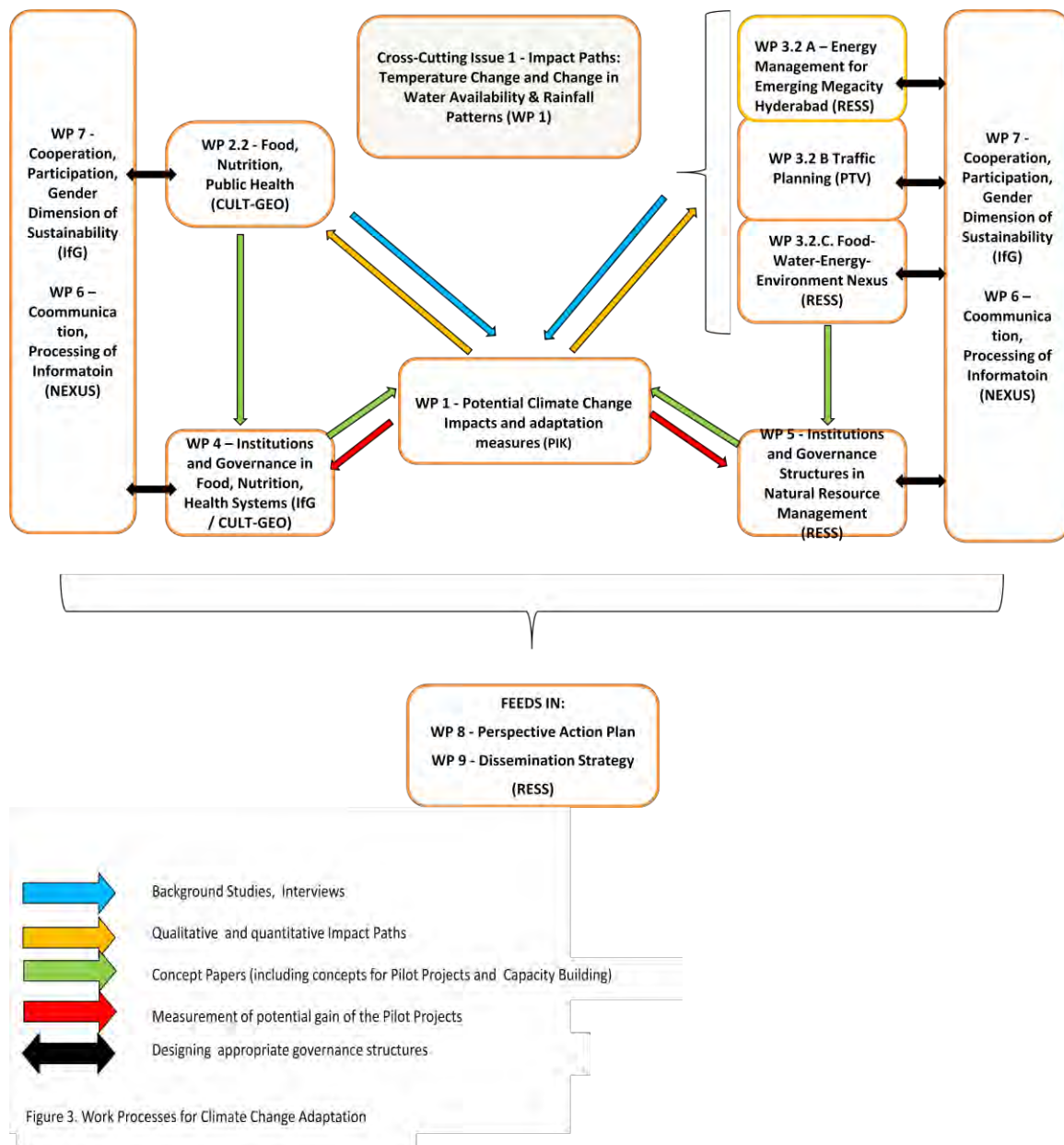
1.4.2 Impact Paths: Temperature Change and Change in Water Availability & Rainfall Patterns (WP 1)

In WP 1 the possible consequences that may arise for the city of Hyderabad with the now increasingly significant changes in the earth’s climate are assessed in conjunction with sector-specific thematic areas (transport, food supply security and health, energy security, water and natural resources), and adaptive measures are developed. For this, climate simulations for the most important Atmosphere-Ocean-Global Circulation Models (AOGCMs) are calibrated with station data (downscaling) and the statistics for various projections for the 21st century are compared with each other. This facilitates an evaluation of the variability of the AOGCM findings and indicates the error ranges and uncertainties that will be kept in mind when carrying out further analysis, for example when generating and drawing insights concerning different adaptive measures. The effects of climate change will be felt in all the thematic areas. Assessment by WP 1 of the direction, level and distribution of the individual climate variables, as well as the uncertainty levels within the 21st century projections, will be both helpful and necessary for the work of all the other WPs, whose work and pilot projects should be set up in accordance with this information. At the same time, the analysis of the influences that certain climate variables may exert within the various thematic areas (which is the purpose for which the impacts network has been set up) can only be achieved with assistance from specialist partners from the thematic WPs and local and regional actors on the ground in Hyderabad. An intensive collaboration with all of the other partners is necessary, since climate changes will be noticeable within all the thematic areas. In Figure 3 an overview of the work flow and interactions required to facilitate and organise this collaboration are presented, structured according to the corresponding analytical steps of the project

WP 1 requires detailed information from the individual thematic areas relative to characteristics that are pertinent to climate change adaptation. These are to be obtained from the Background Studies completed by the thematic WPs or from interviews that the thematic WPs carry out in the framework of their research where climate change adaptation relevant questions are integrated (*blue arrow*). On the basis of this knowledge, WP 1 can at first postulate qualitative and then eventually also quantitative impact pathways (*yellow arrow*). This information is needed by the thematic WPs in order to lay the foundations for their own work of preparing Concept Papers. The Concept Papers outline concrete themes and specific concepts related to the operating of a climate friendly and energy efficient development trajectory (as measured against the sustainability scenario). At the same time, concepts for possible pilot projects and for the Capacity Building Modules are being developed.

This work is to be seen as a process of “social engineering”, and takes place under close agreement with the local stakeholders and partners, whose understanding of and capacities to carry out the associated work must also be generated as part of the collective activities of the project. Here the so-called process of social construction is particularly important to the discovery – and invention – of new institutions and governance structures and the production of their associated practical effects. Through the use of CATHY (Climate Assessment Tool for Hyderabad) grounds for and ways to bring about changes in institutions and governance structures can be more readily observed. This urban assessment tool makes it possible to expose and to weigh up spatially based interest conflicts against technical, political, institutional and organisational factors and to search for alternative social organisation configurations. In this

way, various planning and operating alternatives, along with their social and material implications, can be judged for their desirability and comparisons can be made between them.



The two Institutions-and-Governance-WPs (WP 4 and WP 5) generate the analytical domain within which concepts for the pilot projects will be elaborated upon and tested, up through to the point where they are ready for launch and are then implemented within actual pilot projects (*green arrows*). A precondition for ensuring the achievement of the enduring implementation of the institutional innovations elaborated in the Concept Papers is close coordination with the process oriented WPs, through which local requirements for the adaptive innovations of the governance structures are stipulated (*black arrows*). In turn, building upon the basis provided in the Concept Papers, WP 1 calculates the estimated gains realized by the adaptive measures (*red arrows*). The results of this process are integrated into the Perspective Action Plan (PAP)

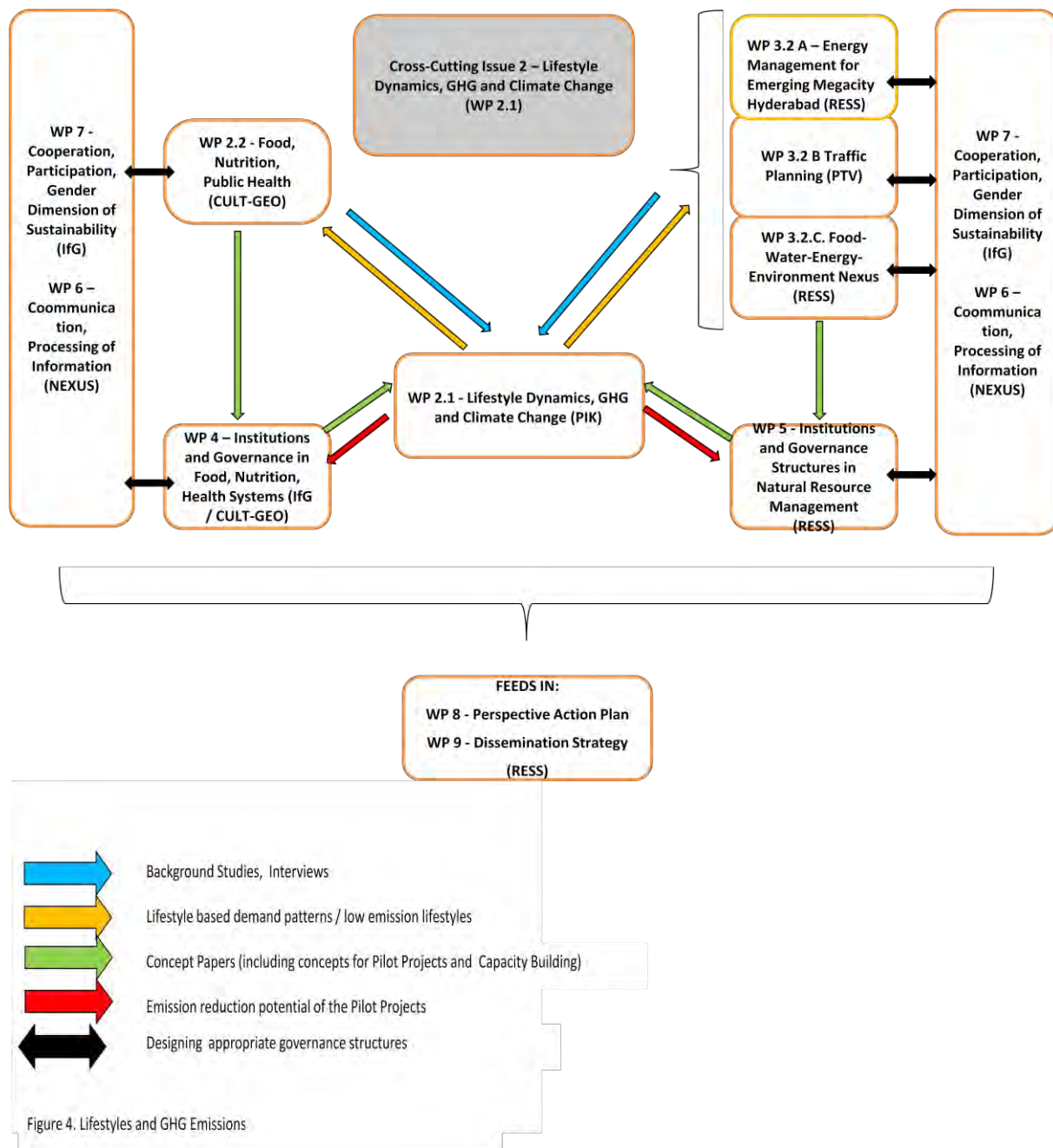
Overview 1: Application and Implementation Processes from Work Package 1

Deliverables (May 2009)	Application Orientation of the Deliverable	Future Stages of the Project: Pilot Projects / Tools, Upscaling / Transferability
Evaluating Climate Change Scenarios - From AOGCMs to Hyderabad (2009 / PIK / Nr. 1)	Climate Change Scenarios for Hyderabad Yellow Arrow, Figure 3	Transferability: with respect to content specific to Hyderabad, with respect to method widely transferable
Additional Study: Preliminary Analysis of Qualitative Climate Change Impact Networks for Hyderabad/ India	Qualitative Assessment of the „Impact Paths—into the individual thematic areas Yellow Arrow, Figure 3	Tool: „Climate Assessment Tool for Hyderabad— CATHY Transferability: other Megacities with similar endowments from the natural environment

1.4.3 Lifestyle Dynamics, Greenhouse Gases and Climate Change (WP 2.1)

This work package seeks to identify and assess the influence of lifestyle and consumption dynamics on energy use, related GHG-emissions, and the ability to adapt to climate change. Based on these analyses, we want to develop (if feasible, group-specific) strategies to improve energy efficiency, to reduce GHG emissions, and to enhance the adaptive capacity of the inhabitants of Hyderabad. These strategies will be tested in pilot projects and subsequently—after a possible re-design due to up-scaling—tailored for city-wide policy recommendations. We focus on the direct and indirect energy use of private households, on food related emissions, and on mobility patterns/transportation. The concept of lifestyle refers to typical patterns of how people lead and interpret their everyday life, based upon their social situation and the values they adhere to. The scientific challenge of this WP from a sociological point of view lies in the fact that we want to develop a common conceptual and methodological framework of lifestyle analysis that spans the total social space in Hyderabad, i.e. covering the livelihood of poor slum dwellers as well as those of the middle and upper classes. Lifestyle changes may be caused by changes of the social situation, but also—in cases of constant social situation—by changes of preferences and values. Social drivers for lifestyle changes may include income changes, value changes, mass media trends, globalisation, political changes and the like.

The work flows and interactions with other projects are sketched in Figure 4. There are two core tasks: First, to assess the perception and evaluation of climate change and climate policies by stakeholders, decision makers and in the mass media. This will, among other things, help the other Work Packages to frame their pilot projects and policy recommendations accordingly. Second, WP 2.1 has to assess and quantify the lifestyle-based GHG-emissions in Hyderabad, as well as the assessment of avoided emissions due to lifestyle and institutional changes.



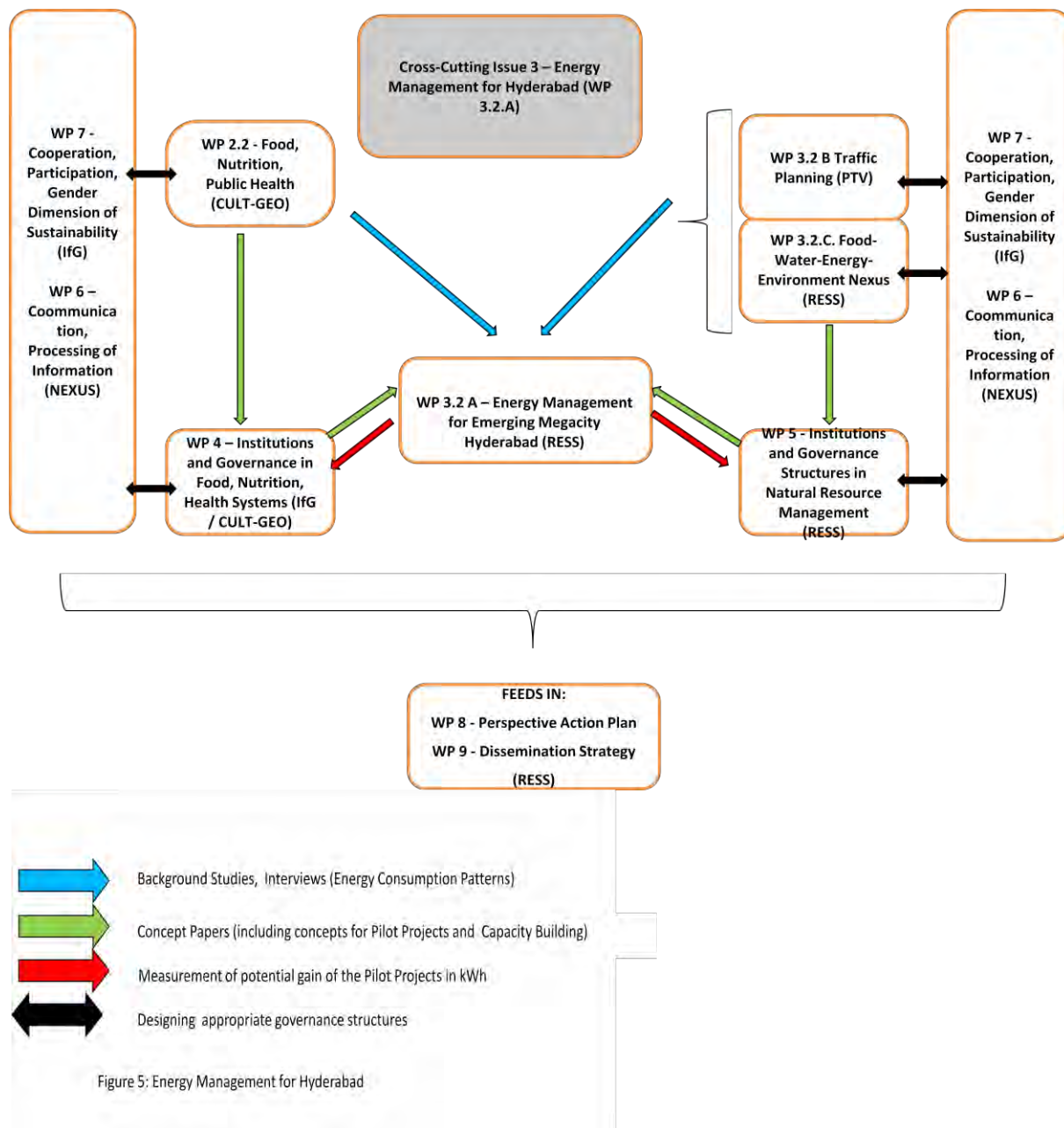
In a first step, we will use Background Studies from the other Work Packages in order to identify prevailing lifestyle drivers (e.g. consumption/mobility patterns, *blue arrow*). In a second step, WP 2.1 will then deliver lifestyle-based demand patterns and possible scope for low emission lifestyles (*yellow arrow*). This will become relevant for the later development of Pilot Projects and Concept Papers in which the Hyderabad lifestyle situation will have to be addressed (*green arrow*). Exchange with process oriented Work Packages (WP 6 and 7) is necessary here in order to translate institutional innovations into effective governance structures (*black arrow*). Together with WPs 4 and 5, WP 2.1 will assess the GHG reduction potential of their respective Pilot Projects (*red arrow*). The results of this process are integrated into the Perspective Action Plan (PAP).

Overview 2: Application and Implementation processes from Work Package 2.1

Deliverables (May 2009)	Application Orientation of the Deliverable	Future Stages of the Project: Pilot Projects / Tools, Upscaling / Transferability
-Stakeholder Analysis” (2009 / PIK / Nr. 2)	Identification of the relevant actors associated with the areas of climate and climate change Yellow Arrow, Graphic 4	Making the methods transferable for use in the study of other Megacities
Additional Study: Empirical Analysis of National and Local Climate Discourse	Relevance of the theme Climate Change in the Print Media and for the key stakeholders in India	Pilot Project: -Social Experiments on Low Emission Lifestyles” Upscaling: -Low Carbon Lifestyles” transferability: Indian Megacities

1.4.4. Energy Management for Hyderabad (WP 3.2.A)

WP 3.2.A Energy Management for Hyderabad serves a double function. On the one hand, it is oriented toward specifying a sustainable, efficient, affordable, safe and stable energy supply for Hyderabad. In the key sectors of energy production, transmission, distribution and consumption, working within the framework provided through the Background Studies, the requisite specific energy data will be generated from which the potential for achieving the project goals can then be deduced. The second task – the one that is relevant here – consists of a calculating and evaluation function in the form of a quantification of the potential for energy efficiency improvements in other areas of the society outside of the energy sector (specifically, those within the thematic areas of the project). In addition, the studies and analyses carried out under the thematic WPs will be examined with a view to their energy efficiency effects (*blue arrows*). With respect to the topics of water, food and health, transportation, and trade and finance (i.e. the banking sector), based on the intended changes proposed by the individual WPs (*green arrows*), consumption and production effects will be calculated and converted into avoided kilowatt hours of usage (*red arrow*). In the end, this will have given rise to the same substantive quantitative results than will be available for thematic WP 3.2.A. The work processes and flows that will produce this outcome are presented in Graphic 5 (below).



1.4.5. Thematic Work Packages

WP 2.2 – Food, Nutrition and Public Health (CULT-GEO and Indian Partners)

In this component of the project, Hyderabad's food supply system is to be examined within the wider contexts of global change (climate change and globalisation) and energy efficiency. The motivation for this work is based on the thesis that climate change and some aspects of globalization, which are to be expected to increase in the coming decades, are already today seriously threatening the already fragile food supply, nutrition security and health of the residents of Hyderabad. The city's poor are especially exposed to the risks that may be manifested during a food supply crisis and are extremely vulnerable in respect to nutrition security and malnutrition-related illnesses. They are totally defenseless against price increases, loss of purchasing power and possible nutrient-strapped periods – and this is in spite of a diversified set of public support programmes, which are generally poorly implemented and too seldom reach those who are truly in need.

In Hyderabad, as has long been the case, roughly three quarters of the city's population lives on less than 2 US Dollars (PPP)/Person/Day. At the same time, however, the increasingly resource- and emissions-intensive lifestyles of a growing over-layer of affluent residents is contributing to the overuse of natural resources (land cover, water and air) and to increasing climate-relevant emissions (see, among others, Fernandez 2006; Medley 2004; Ravi 2007). In contrast to the malnutrition sicknesses of the poorest of the city's residents, increases in nutrition-related illnesses that arise from excessive and unhealthy food consumption are to be seen among the city's most well off. The aim is, thus, to achieve improvement in the urban supply of foodstuffs, in the nutrition security of the city and in the general nutrition status, without significantly increasing the food-carbon footprint, supported by (1) low-carbon food provision, (2) low-carbon and healthy diet patterns.

Overview 3: Application and Implementation Processes for Work Package 2.2

Deliverables (May 2009)	Application Orientation of the Deliverable	Future Stages of the Project: Pilot Projects / Tools, Upscaling / Transferability
Background Study: „The Changing Food Retail Scene in Hyderabad— (2009 / CULT-GEO / Nr. 3)	Background information concerning a climate-neutral and energy efficient food supply distribution system in Hyderabad Blue Arrows, Figures 3, 4 & 5 Black Arrows, Figures 3, 4 & 5	Pilot Projects: Sustainable Street Food Plan Upscaling: Low-Carbon Food Provision, Healthy Diet Patterns and Food Security in Hyderabad Transferability: Indian Megacities
Stakeholder Analysis: „Challenge of Organizing Hyderabad's Highly Dynamic Food System Under Conditions of Global Change” (2009 / CULT-GEO / Nr. 4)	Identification of the most important key actors to be included in the conceptual development of the „Capacity Building—and Pilot Projects	see above
Background Study „The Market for Organic Food in Hyderabad: An Assessment of Consumer Attitudes and Marketing Opportunities” (2009 / CULT-GEO / Nr. 5)	Background information concerning the contribution of ecological farming to a climate neutral and energy efficient food supply distribution system Blue Arrows, Figures 3, 4 & 5 Black Arrows, Figures 3, 4 & 5	see above
Background Study: „Women Street Food Vendors in the Food System of the Emerging Megacity Hyderabad: Opportunities and Constraints— (2009 / CULT-GEO/ Nr. 6)	Street Food Vending and Gender Blue Arrows, Figures 4 & 5 Black Arrows, Figures 4 & 5	see above
Background Study: „Changing Food Culture in	„Globalizing Impacts on Food Culture—	see above

<p>Globalizing Hyderabad— (2009 / CULT-GEO / Nr. 7 Additional Studies: a) –Food Consumption and Nutritional Status in Hyderabad: An Empirical Study on the Poor and Middle Income Classes” b) –Urban Food Security at Risk: Empirical Survey among the Poor and Lower Middle Classes in the Emerging Megacity Hyderabad”</p>	<p>Blue Arrows, Graphics 3, 4 & 5 Black Arrows, Graphics 3, 4 & 5</p>	
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WP 3.2.A – Energy Management for the Emerging Megacity of Hyderabad (RESS and Indian Partners)

At the centre of project component area 3.2.A – *Energy Management for the Emerging Megacity of Hyderabad* – stands an integrated assessment of the energy system with a view to the climate relevance and the efficiency of the associated energy management strategies. Energy consumption is a central dynamic linking together the production of climate relevant GHG-emissions and the sectorally based utilisation of energy for water supply, household requirements, transportation and trade and for the cumulative energy expenditures associated with provision of goods and services. This analysis is based upon having ascertained the existing production and consumption structure of the energy sector in Hyderabad (Background Study). With this foundation, the prospects for creating a sustainable, efficient, affordable, safe and stable energy supply will be determined and measures and associated criteria (Capacity Building) for its implementation will be specified (target function of the WP). The data concerning the energy production, transmission, distribution and consumption associated with the key sectors will be determined within the context of the Background Study, from which the potential for achieving implementation of the target functions can then be deduced. With a Stakeholder Analysis serving as the integrative component of the Background Study, the involvement of the local actors in the project work will be ensured while, at the same time, the interactions between the key activity areas will be analysed with a view to assessing their energy efficiency potential. Appraisal of the analysis, with respect to regulative, technical and economic reductions options will build on this. The Pilot Projects will be configured accordingly. On the basis of this, an Efficiency Scenario will be developed which will be used for the development of the Capacity Building Module. This serves the objectives of quantifying the emissions and efficiency effects that are necessary to achieve a sustainable Hyderabad and identifying the governance structures that will be required to achieve their lasting realisation.

Overview 4: Application and Implementation Processes of Work Package 3.2.A

Deliverables (May 2009)	Application Orientation of the Deliverable	Future Stages of the Project: Pilot Projects / Tools, Upscaling / Transferability
Background Study (2009 / RESS / Nr. 8)	Market supply, market demand, provisioning gaps, production and network structures, character and scope of regulation (basis for a reference scenario for the development of energy efficiency criteria). Blue Arrows, Graphics 3 & 4 Black Arrows, Graphics 3 & 4	Pilot Projects: areas of renewable energies (RE), Clean Development Mechanism (CDM), RE certification system, energy production from waste Upscaling: energy efficient Masterplan for Hyderabad Transferability: Megacities with similar energy production and consumption structures
Stakeholder Analysis (2009 / RESS / Nr. 9)	Identification of the most important key actors to be included in the conception and development of the Capacity Building and Pilot Projects	see above

WP 3.2.B – Traffic Planning (PTV and Indian Partners)

The motorized single passenger vehicle traffic in Hyderabad is increasing at an alarming rate. During the period from 1980/1981 to 2000/2001 the number of motorcycles climbed by a factor of 14, that of passenger cars by a factor of 12 and that of auto-rickshaws by a factor of 8.5. Over the same time period, the number of buses – which can serve as a stand-in for all public transportation – rose only by a factor of 3.8 (Gap 2006). In response to this great increase in traffic flow, previously adequate and accessible pedestrian pathways were in the course of street-widening programmes almost entirely removed in order to provide space for motorized single passenger vehicles. As a result, pedestrians and cyclists are today forced to move along the side of the street, without any infrastructure of their own and are, thereby, being placed in great danger.

Consequently, even short journeys are made using either auto-rickshaws, motor cycles or private cars. This means that it is precisely the pedestrian and cyclist traffic, followed by that of public transport, which promise the greatest potential for reducing the volume of transport-related CO₂ emissions. Reduction of the GHG-emissions produced by the transport domain, and of the other environmental impacts that accompanying motorized transport (particulate pollution, accidents, etc.) can only be achieved through an integrated transport strategy (vgl. GTZ 2004 u. 2007). Such strategies cannot concentrate exclusively on the mode of transport, but must also take into account the question of how both the advantages and the demands associated with the provision of these various modes of transport play out within the system. Therefore, the research approach presented here places the formulation of a foundation for further integrated planning at the forefront, in an attempt to view city development, city-hinterland relationships and transport

as a single system, in order to achieve a resilient, energy efficient, and comprehensive transport system. At the same time, adaptation of this infrastructure in response to climate change is also given adequate attention through the possibility that the increased capacities of the transport system will be damaged or destroyed through the occurrence of climate change related severe weather events.

Overview 5: Application and Implementation Processes of Work Package 3.2.B

Deliverables (May 2009)	Application Orientation of the Deliverable	Future Stages of the Project: Pilot Projects / Tools, Upscaling / Transferability
Concept for the Assessment Procedure (2009/PTV/Nr. 10) (July 2009)	Development of a procedure for the assessment of the various options for taking action in the transport sector	Tool: „Strategic Planning Tool— for processing of the transport problems Transferability: Megacities
Concepts for Pilot Projects (2009/PTV/Nr.11)	Data collection and conceptualization phases Yellow Arrows, Graphics 4 & 5 Black Arrows, Graphics 4 & 5	Pilot Project: small scale, local measures for the improvement of the transport situation, using a participative approach Upscaling: Hyderabad Transferability: Megacities elsewhere

WP 3.2.C - Food-Water-Energy-Environment Nexus (RESS and Indian Partners)

The Food-Water-Energy-Environment Nexus emphasizes the tight linkages between the water sector, energy efficiency strategy and their associated consequences for climate change. An energy efficient water supply system holds out great promise for mitigating climate change. Similarly, efficient water management is fundamental to any adaptation strategy, be it oriented toward the already manifest or anticipated climate changes. And, above and beyond this, the ways in which complex city-hinterland relationship influence agricultural demands for water and also the ways in which changes of lifestyle and consumer behavior lead to changes in water demand are exceptionally relevant for ensuring both the quality and the quantity of water available in the city (Ramachandraiah 2004).

Analysis of the potential for increasing energy efficiency in the water sector is structured around the research question: keeping in mind the local conditions, by which means and in what magnitudes can savings be achieved in the energy consumption associated with the provision of the water supply? As a first step, the water-energy nexus stands at the centre of the research. One possibility that is being explored entails modifying the administrative structure, using control mechanisms or forms of incentives, so as to completely and efficiently use the water that flows into the city due to gravity. At present, due to insufficient coordination of the concerned administrative units, a significant amount of the surface water of the city is either not used or becomes polluted.

The Krishna water supply project provides an expanding, energy intensive and GHG generating system for transporting water to Hyderabad (Celio und Giordano 2006). A more adequate compensation mechanism should therefore incorporate the following parameters: quantity and quality of the surface and ground waters, summer and rainy season, urban water demand, rural water demand. Using these and other specification parameters, it is possible to develop a model that reduces the necessary pumping effort of the Krishna water supply project. Using this model, it will then be possible to feed in data regarding energy balances, making it is possible to role-

play reallocation procedures where water usage savings associated with demand reductions within the urban areas that would then be satisfactorily connected to the supply system could be periodically redirected to agricultural farms that are heavily dependent on their irrigation systems. Another advantage of this type of model is that it could be integrated into the planning process of the Godavi water supply project, which will pump twice as much water to Hyderabad compared to the Krishna project.

Overview 6: Application and Implementation Processes of Work Package 3.2.C.

Deliverables (May 2009)	Application Orientation of the Deliverable	Future Stages of the Project: Pilot Projects / Tools, Upscaling / Transferability
Background Study (2009 / RESS / Nr. 12)	Analysis of the interface between water and energy through case studies Blue Arrows, Graphics 3, 4 & 5 Black Arrows, Graphics 3, 4 & 5	Tool: Increasing the energy efficiency of the water supply system through peri-urban compensation opportunities Transferability: Megacities
Stakeholder Analysis (2009 / RESS / Nr. 13)	Identification of the most important key actors to be included in the conceptual development of the Capacity Building and Pilot Projects	see above

WP 4 - Institutions and Governance in Food, Nutrition and Health Systems (IfG, CULT-GEO and Indian Partners)

WP 4 plays a central role in the project and provides a counterpoint to WP 2. In WP 4, the institutional innovations and governance reforms intended to support climate friendly and energy efficient development of Hyderabad’s food/nutrition and health sectors will be developed. One example of this is the prospect of reducing GHG-emissions through a food supply distribution systems of short-cuts. In such a system consumers would be expected to purchase their foodstuffs within walking distance from their residences and to be able to do so without having to resort to motorised transportation. This would require, in some instances, targeted enhancement and retention of the market competitiveness of the traditional, decentralized retail formats (Kirana grocery stores, street food vendors). For this, institutional changes (e.g. in the informal rules) are needed on the demand side, but also on the supply side and in the governance-structure with respect to the practical provision of necessary associated incentive structures. These can be set up, for instance, through community associations of Street Food Vendors or Kirana Shops, putting them in a better position to compete with supermarkets. Establishing such a process for moving toward a low emission lifestyle requires information from the Background Studies and Stakeholder Analyses developed in WPs 2 and 4, which are a precondition for the development of institutional innovations, because it is through them that the relevant interest conflicts and synergies will be uncovered and made clear (see original application, section 2.4). The explorations concerning innovation, carried out within WPs 6 and 7, where local instances of innovation that are consistent with local governance forms are studied, is a precondition for an effective implementation of institutional innovations (see section 1 above). In a group exercise to take place in Hyderabad, a special module for Capacity Building and Pilot Project development will be prepared and implemented (the main activity phase of these WPs begins after the first milestone has been reached, in May 2009).

WP 5 – Institutions and Governance in Natural Resource Management (RESS and Indian Partners)

WP 5 is the counterpoint to WP 3. In WP 5 the institutional innovations and governance reforms in the area of natural resources (energy, water) are to be developed, which are intended to support Hyderabad's climate friendly and energy efficient development. Just one example of these is the manufacturing of biodiesel from the Jathropha Plant in the peri-urban area of Hyderabad. For making Jathropha production into a new institution, a change in governance at the administrative level is required that provides incentive structures for small scale farmers in the greater Hyderabad areas, thanks to well structured and realistic sales agreements (e.g. for public transport). This would contribute substantially to emissions reductions and at the same time reduce peri-urban out-migration by creating new job opportunities in these areas. As has already been indicated above, with respect to WP 4, WP 5 is moving through this project development space with WP 6 and 7 as companions, drawing extensively on information provided in the Background Studies and Stakeholder Analyses in order to support institutional innovations and governance reforms by contributing to learning and implementation processes operationalised through the Capacity Building work and Pilot Projects (the main activity phase of these WPs begins after the first milestone has been reached, in May 2009).

1.4.6. Process Oriented Work Packages

In WP 4 and 5 institutional innovations intended to lead toward climate friendly and energy efficient measures will be developed and refined in collaboration with the teams that have been working on the cross-cutting issues of the project and with the WPs that have analysed the relevant information and characteristics of the individual subsystems, i.e. the thematic WPs. These will be combined with the actual operationalisation of the proposed rules through either small or large changes in the governance of Hyderabad, as has already been highlighted in section 1 above. This goal is to be reached with the help of the participative, communicative and cooperative approaches of the process oriented WPs, as well as with a special Discourse Model (see section 2.3.1).

WP 6 – Participation and Communication Strategies (NEXUS)

Participative and communicative approaches are crucial for this project, on the one hand, in order to make knowledge regarding the impacts of climate change and of mitigation and adaptation strategies accessible for all the relevant stakeholders and, on the other hand, to make good use of the knowledge held by the locally affected communities in order to develop these strategies. Discussions regarding the causes and impacts of climate change are taking place at various levels within the global society, however, in India they reach only a very limited proportion of the population. Subsequently, in order for the political strategies developed to ensure a sustainable, climate friendly arrangement of the megacity's growth process, there is a need for close collaboration with the wide variety of actors from Hyderabad's civil society, free enterprise and scientific communities. Through „capitalising—participative processes (citizen exhibitions, online dialogues, organisation of stakeholder dialogues, held in order to discover differing interests and eventually also lines of conflict and approaches for resolving them) it is expected that identification with the theme of climate protection and energy efficiency will increase among the various actors and, for example, citizen-motivated independent initiatives may take hold, leading to changes in consumer profiles helping to reduce overall energy consumption. Responding to climate change and achieving abatement of emissions requires new forms and means of communication and participation. WP 6 investigates how participative approaches can be useful for the crafting or transforming of institutions and collections of rules.

Overview 7: Application and Implementation Process of Work Package 6

Deliverables (May 2009)	Application Orientation of the Deliverable	Future Stages of the Project: Pilot Projects / Tools, Upscaling / Transferability
Background Study: Constraints and Opportunities for Participation and Communication: Development of Communication and Participation Strategies (2009 / NEXUS / Nr. 14)	Investigation of concrete locally appropriate governance mechanisms and processes leading to instances of realisation of institutional innovation Black Arrows, Graphics 3, 4 & 5	Pilot Projects: as a process oriented WP, WP 6 works together with WPs 2.1, 3.2.A, 3.2.B & 3.2.C. on their respective Pilot Projects Transferability: Megacities

WP 7 – Cooperation, Participation and Gender Dimensions of Sustainability (IfG)

WP 7 is dedicated to investigating the possibilities that can be provided through cooperative governance structures and associations in the sectors of food (related to WP 2) and energy provision (related to WP 3) and poses the following research questions: to what extent can cooperative governance structures and associations improve the supply systems in these two sectors, to what extent can they strengthen climate-change and energy-demand mitigation measures and to what extent can they help with the work of developing adaptation strategies?

Whether associations and cooperative governance structures can be successful in supporting these objectives depends upon how their members, in the course of establishing organisations, engage with and overcome typically arising problems of collective management (Olson 1965; Ostrom 1990). Here, the establishment of the appropriate incentives for entry into and cohesion of the association must be agreed upon, but the rules of the game concerning fair distribution and use of gains (market access, discounted purchase and sale prices, supply chain security agreements, etc.) also have exceptionally great importance for the members. WP 7 will analyze to what extent strengthened cooperation in the areas of food provision and energy can bring about socio-economic and climate relevant benefits and which forms of cooperation can lead to success, the end of this analysis being to develop cooperation models that will be concretely implemented in the Pilot Projects and that are transferable for use in the thematic WPs. Within this framework, WP 7 investigates possible incentive structures („rules of the game“) that can guarantee effective operationalisation of new institutions: systems of rules which are established, for example, formally through association bylaws or statutes, cooperation contracts developed informally through understandings and confidence building and also through practice as rules-in-use. WP 7 is carried out with the primary aim of postulating possible cooperative low emission provision forms in the food supply and energy distribution sectors.

Overview 8: Application and Implementation Processes of Work Package 7

Deliverables (May 2009)	Application Orientation of the Deliverable	Future Stages of the Project: Pilot Projects / Tools, Upscaling / Transferability
Background Study/ Stakeholder Analysis In search of Low Emission Pathways: A study on Energy and Food Consumers in Hyderabad (2009 / IfG / Nr.	Analysis of traditional business and commerce practices and their CO ₂ relevance (Kiranias). Analysis of consumer practices and supply	As a process oriented WP this WP will carry out Pilot Projects which generate results that are also equally relevant for the WPs 2.2, 3.2.A and 3.2.C. Transferability: Megacities

15)	relationships in the energy sector (households and businesses) Cooperation possibilities Black Arrows, Graphics 3, 4 & 5	
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WP 8 – Perspective Action Plan, Institutional Innovation and Governance Reforms (RESS)

The results of all projects will be used to formulate a coherent strategy in order to realize the climate friendly and energy efficient development path described by the Sustainability Scenario, resulting in the Perspective Action Plan (PAP). There is a logical relation between the Sustainable Development Framework (SDF), the Sustainability Scenario and the PAP. The SDF is the framework within which the Sustainability Scenario can develop; it is generated based on knowledge production, knowledge transfer and capacity building, and is operationalised and trial tested, thereby serving as the basis for “social construction” for developing the Sustainability Scenario. The PAP, meanwhile, describes the necessary steps for implementing the Sustainability Scenario and will be assembled from the third project year onwards.

During the past milestone year, the project partners have already designed a tool that will be an integrative part of the PAP. In order to implement the results of the project, meetings between the relevant stakeholders of a certain thematic field will be necessary. In the framework of these meetings, the task of this tool, known as *Crafting Rules by Discourse*, is to bring about solutions to conflicts and the realization of mutual gains by the discussion of and agreements on rules of private or public ordering. An urban development and consensus-building tool, it will be developed systematically and contribute significantly to the implementation of the project’s results in the context of inter-agency rounds.

WP 9 – Dissemination Strategy, Policy Papers, Policy Learning and Workshops (RESS)

The task of this WP is to disseminate the project’s results. Several channels will be used for dissemination so as to ensure, on the one hand, the implementation of the results in Hyderabad and, on the other hand, to assure the transfer of the results to other megacities. Dissemination at the local level in Hyderabad is particularly important. This will be the task of the Centre for Sustainable Hyderabad, affiliated to the Center for Good Governance (CGG - <http://www.cgg.gov.in/>). This will allow efficient planning and organization of *Policy Learning Workshops, Institutional Innovation Workshops, Training-on-the-Job* measures as well as of activities aimed at creating a *enabling environment*. Publications in international scientific journals, contributions to international workshops and conferences as well as dissemination among development corporations (EZ) will also play an important role. Another important task will be the education and training of doctoral students and postdocs in order to assure the multiplied use and application of the concepts that have been developed. Care and excellence in this core area of applied science are of the highest priority for the Hyderabad Project. The concept for a dissemination strategy is summarized in Deliverable 2009/RESS/Nr. 16.

WP 10 – Project Management (RESS)

WP 10 coordinates the Megacity Project Hyderabad, stimulates internal project communication and observes as well as evaluates the progress of the project. To this aim, a transparent Monitoring and Evaluation System has been developed. Furthermore, the communication software Collanos has been installed for use among project participants. This software enables decentralized information and data exchange and contributes significantly to the common generation of knowledge (see Deliverable 2009/ RESS/Nr. 17 for more information).

2. Capacity Building, Pilot Projects, Implementation and Transferability

2.1. Capacity Building Measures

The preparation and implementation of Capacity Building measures and Pilot Projects form the operational nucleus of the entire project. The objective of the Capacity Building measures is, on the one hand, to renovate the research findings interdisciplinarily towards finding a solution for a concrete infrastructure problem in Hyderabad and transfer this to the decision makers in politics, economy and development organizations through „Personal and Organizational Development— (Capacity Building), i.e. preparing them towards establishing and strengthening of personal and organizational capabilities and problem solving capacities. This is the reason why not only well known experts with sound thematic background are involved, but also those who are capable of developing holistic and replicable modules for implementation and are capable of transferring this know-how convincingly. Due to the interdisciplinary character and necessity of common planning and implementation with the responsible administrative units in India, this task (including Pilot Projects) will be accomplished by the Overall Coordination (Humboldt University of Berlin).

The Following Capacity Building Measures are planned:

(a) *Thematic Capacity Building*: These contribute towards deepening of scientific knowledge and scientific exchange about the relevant Topic i.e. Work Package. This will be organised for the concerned participants of the WPs involving Indian and German postdocs and doctoral students as well as the Indian partners and stakeholders. As current climate and energy research is relatively new (particularly in Hyderabad), it is indispensable that experts be involved. Implementation of the Workshops for Capacity Building will be a task of the concerned project partner. A number of thematic Capacity Building measures have already been implemented or are presently being designed and will serve as a conceptual base for the common drafting of cross cutting Capacity Building measures encompassing all relevant project topics and WP areas (see detailed description of Capacity Building in WP Reports in Annex 3).

(b) *Cross-Cutting Capacity Building*: Starting from an overarching theoretical view of the cross cutting topics of sustainability and governance, as elaborated in section 1.4, an integrated examination of the three concrete cross section topics are made: (1) *Impact Paths: Temperature Change and Water Availability & Rainfall Patterns*; (2) *Lifestyle Dynamics, GHG-Emissions and Climate Change* und (3) *Energy Management for Hyderabad*. The conceptual outcomes of this research will be used towards the solution of the concrete problems in the form of the following cross-cutting Capacity Building measures and Pilot Projects by transferring them into a utilization process and implementing them for testing:

- (a) Climate change: mitigation and adaptation strategies for Greater Hyderabad;
- (b) Regulatory reforms and governance;
- (c) Clean Development Mechanisms (CDM);
- (d) Sustainable transport;
- (e) Energy efficiency with regard to water, housing, transport, cooking;
- (f) Sustainable food and nutrition;
- (g) Pollution abatement;
- (h) Water management;
- (i) Waste management;
- (j) Health; and
- (k) Consumer cooperatives for energy efficiency.

2.2 Pilot Projects

After establishing and strengthening personal and organisational capabilities and problem solving capacities of the important stakeholders and partners in Hyderabad through Capacity Building measures, Pilot Projects are planned as specific testing units so as to initiate concrete replication of scientific-technical and development-policy solutions into the overall development process. These Pilot Projects have the potential of being implemented continuously. Their appraisal incorporates classified methods of upscaling and transferability checks. The following are the categories in which Pilot Projects are planned (of which those mentioned in Part 1 of the report take part).

- I. Regulatory reforms and urban governance with regard to infrastructure sectors, e.g. energy, transport and water;
- II. Industrial pollution: abatement policy, commitment, implementation, and evaluation;
- III. Energy efficient technologies, e.g. for industry, water, housing, transport, cooking;
- IV. Public–Private Partnerships: green technologies for energy, water, housing, transport, and waste;
- V. Socio-technical experiments to promote low emission lifestyles;
- VI. Clean Development Mechanisms (CDM): urban and peri-urban forestry for carbon sequestration, bio-diesel for local and urban energy needs;
- VII. Consumer cooperatives for food, energy and housing;
- VIII. Nutrition & health transition: –secondary malnutrition” and emerging –new diseases” (see also the WP Reports in Annex 3)

As in the case of the Capacity Building measures, here too, due to the interdisciplinary character and necessity of common planning and implementation with the responsible ministries and administrative units in India, this task will be accomplished by the Overall Coordination (Humboldt University of Berlin).

2.3 Implementation Strategy and Involvement of Local Actors and Institutions to Achieve the Project Objectives

2.3.1 Overall Implementation Strategy of the Project: The Path towards a Perspective Action Plan

The key domain area of the project is defined physically as climate and energy, whereas the solution of the respective problems at the social action level are focussed on institutional change and governance reforms. Starting from an overarching theoretical view of the cross cutting topics sustainability and governance, as elaborated in paragraph 1.4, an integrated examination of the three concrete cross section topics *Climate Change Mitigation, Energy Efficiency and Climate Change Adaptation as „cross-cutting issues“* will be undertaken.

Thus, the project concept developed for this purpose considers the *mitigation* of GHG achieved through (a) *accounting* via a *consumption-oriented analysis* of greenhouse gas emissions (diet, traffic and transport etc.), considering the central aspects of *lifestyle changes* and aiming at the implementation of *measures for emission abatement* and, so as to evolve *adaptation* measures for Climate Change, (b) a comprehensive study of its *potential impacts* will be conducted for Hyderabad and its peri-urban regions. This study will also focus on *rural-urban linkages*, which Hyderabad needs urgently to cope with key challenges posed by its growth, applied to areas such as energy security, environmental and water management and the designing of measures for transition towards sustainability. To influence this transformation process, (c) *institutional innovations, changes in governance modes and structures, regulatory reforms as well as process oriented policy advice* are needed so as to improve infrastructure in sectors such as energy, transport, water and food as well as to disseminate appropriate energy-efficient technologies.

The overall implementation strategy of the Project therefore aims at achieving the following innovations for Hyderabad and its region:

1. To develop a *Sustainable Development Framework (SDF)*, which focuses on mitigation and adaptation strategies for climate change and incorporates concepts for energy provision as well as increases in efficiency and operates as a knowledge base towards achieving the Sustainability Scenario of the Project.
2. To implement selected *Pilot Projects* and organise *Learning Processes* (including Capacity Building, for example in *Policy Learning Workshops, learning-on-the-job, creating an enabling environment*) for their permanent adoption by setting up appropriate institutions and governance structures.
3. Based on that, to design a strategy for a *Perspective Action Plan (PAP)* geared toward the resolution of these problems – including coherent steps to achieve it – focussing on Energy Management, Transport, Food and Health.

The overall implementation strategy is closely linked with relevant contributions from individual Work Packages.

2.3.2. *Implementation Strategy for the Work Packages: Involvement of Stakeholders and Partners*

Uniform stakeholder and partner maps have been designed as part of the implementation strategy. We differentiate in the Project between stakeholders or actors, respectively between partners or researchers¹. The conceptual preparation of these maps fulfils the following functions:

- (a) Identification of groups, organisations and people who have a significant importance, respectively, a legitimate interest towards the solution of the relevant urban problem and accordingly guarantee the „ownership“ of the Project;
- (b) Enrolment of relevant stakeholders and partners as well as establishing functions of relationships among themselves based upon their potential roles or out of their expected contribution towards solution of the urban Problem; and
- (c) Designing of different processes and systems so as to depict and/or secure the participation of stakeholders and partners at different levels and at different stages.

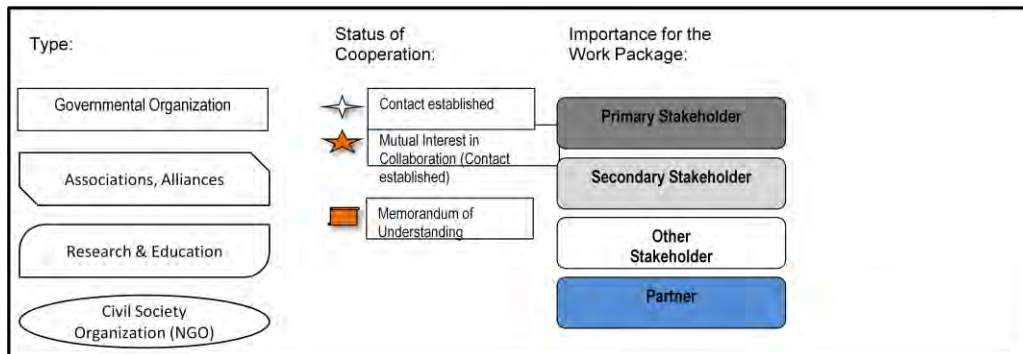
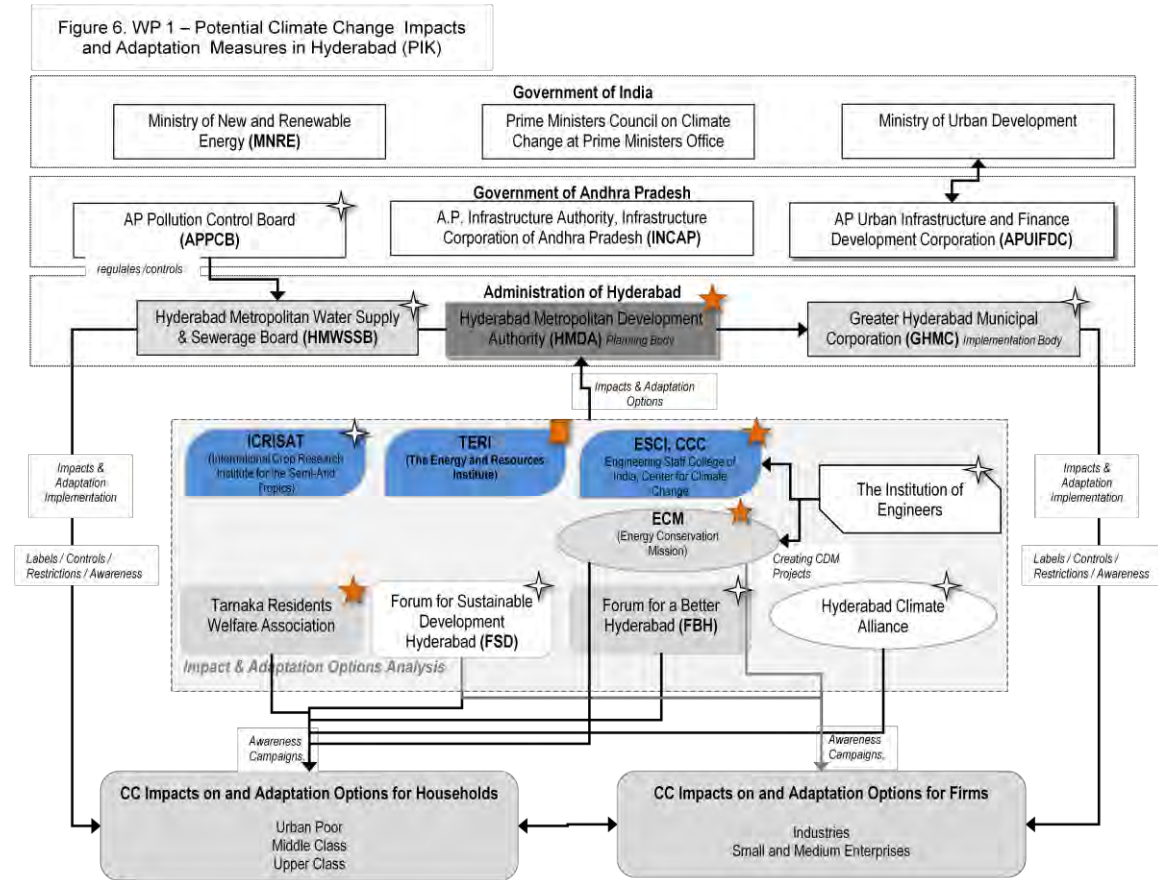
All WPs have carried out such an analysis during the course of the past milestone year so as to concretise application orientation and ensure the implementation of the research results. At the same time, this analysis served as a device to mutually coordinate the implementation process and planning of the necessary capacities among the involved partners. Due to lack of space, these analyses are not described here individually (please refer to Annex 2 for details). Also, in Annex 3 the implementation strategy is described explicitly. However, as an individual example, the map and implementation strategy of WP1 is explained here.

As can be seen from the map of WP 1 – Potential Climate Change Impacts and Adaptation Measures in Hyderabad – the stakeholders and partners have been further specified. Apart from primary and secondary stakeholders, other stakeholders of importance to the project have also been included. A differentiation of stakeholder and partner according to government, non-government and scientific establishment allows us to reasonably classify their current and potential roles. A characterization of cooperative relationships towards respective stakeholders or partners (established contacts, mutual interests or already existing agreements) facilitates a qualitative assessment of the envisaged role. Consequently, the roles and the envisaged

¹ The on-site ~~partners~~ or ~~researchers~~ work out jointly with the German partners the conceptual approaches of each field for a climate and energy efficient path, whereas the ~~stakeholders~~ or ~~actors~~ are those who implement them.

contributions of the stakeholders and partners towards climate change adaptation can be analytically depicted and critically investigated with reference to the intended options of impacts on different social strata of households as well as large, medium and small enterprises.

This process is necessary in the fields of climate change adaptation so as to guarantee a target-oriented implementation of the project through stakeholders' ownership. This has been marked with a yellow star in Figure 6. In some cases (see Annex 2), ownership has already been cleared by signing a Memorandum of Understanding.



For example, the CATHY Programme developed within WP 1 provides an initial contribution towards conceptualising changes of institutions and governance structures. As has already been mentioned in section 1.4.2, this Urban Assessment Tool allows recognition of spatial conflicts of interests, weigh their pros and cons and the finding of appropriate technical, political, institutional or organisational alternatives. Based on that, different policy, planning as well as implementation alternatives and their impacts on concerned population strata, religions, and CO₂ emissions can be kept open for discussion. By doing so, it contributes further towards mainstreaming of understanding of climate change – both from the perspective of adaptation and mitigation – particularly in relation to adaptation, where presently still larger deficits exist in public awareness and capability to adapt. This instrument can help in pinpointing dangerous regions and vulnerable population stratas, employed groups, yearly and time horizons as well as conflict situations and appropriate legal and other necessary measures.

The instrument is based on a multi-actor approach in planning, making it clear who is expected to be affected and in which relevant field. Relevant stakeholders are then brought to one table so as to find conflict resolutions or to come to mutual benefit solutions through discussions and agreements regarding rules in private or public ordering. The tool for accomplishing this is *Crafting Rules by Discourse* (CRD), which will be developed systematically through interagency rounds and will be conceptualized and coordinated in WP 8. Hyderabad Metropolitan Development Authority (HMDA) – the overall urban key stakeholder – is specialized in rule-making, development planning and consensus building and will use this instrument. As shown in Figure 6, close contacts have already been established with HMDA. Accompanied by an intensive round of Capacity Building (learning-on-the-job/creating enabling environments), it is proposed that the model will be transferred to HMDA by the end of the project completion period.

2.4. Transferability of Research Outcomes

Deliberations are currently being conducted by the WPs on how to ensure transferability, as outlined below. All results arising out of these discussions will become part of the Dissemination Strategy of the Hyderabad project.

WP1 – Urban Assessment Models, one of the topics under discussion here, are presently being designed for other larger cities or regions in the world, with whose working groups we maintain contact and from whose experiences the Hyderabad Project can profit. In general, an Urban Assessment Model is specially designed and programmed for a particular city and does not easily allow transference to other cities, in particular when different climate regimes, orographies and continentalities etc. exist. However, discussions with other groups of city modelling researchers show that valuable comparisons of particular classes of cities are indeed possible, especially where some of their characteristics or sub-systems are identical (e.g. monsoon climate, water shortage and dry spells in one half and excess water in another part of the year). Adaptation measures on climate change which originate out of the work done in WP 1 or have been developed with the help of CATHY show a high degree of transferability, particularly if we consider *other cities of the Indian sub-continent*. Although they cannot be transferred blindly, the prevailing similarities in institutional, cultural and political set up within the country allow a high degree of transferability.

WP 2.1 – If structural similarities of other cities with Hyderabad are high, a priori transferability of research outcomes becomes less problematic. The determination of structural similarities and differences is part of the overall Cross-Project work within the BMBF programme ‘Megacities of Tomorrow’, but also may become relevant in the course of publication activities. Transferability from the overall Hyderabad Project ensures, in particular, a strong *orientation towards institutions and governance*, because through it analogies having high degrees of structural similarity can be easily made and implemented.

This relates particularly to the assistance to be gotten from the approach *Crafting Rules by Discourse* (CRD), an urban rule-making development-promoting planning and consensus building tool. Furthermore, in WP 2.1, a *lifestyle approach* is being applied which addresses middle-class and poor people, facilitating methodological transferability. Given the necessity of generalisation at the level of master plans and policy briefs, a further possibility for integration also exists.

WP 2.2 – Detailed discussions with representatives of the GHMC (Greater Hyderabad Municipal Corporation), NGO delegates and Lobbyists (e.g. street food vendors) have fulfilled the prerequisites for a phase of knowledge generation, Awareness Raising and Capacity Building, so that the proposed sustainable street food plan can be implemented, which can be seen as an important element of a decentralised, resource-saving and socially sustainable urban food provision system. This will be achieved in close conceptual and organisational cooperation with the Institute for Cooperative Sciences (IfG), which is dealing with the topic of promotion of stationary retail shops. Transferability of the sustainable street food plan to other Indian Megacities is envisaged. Initial discussions regarding this task have already been held with representatives of NASVI (National Association of Street Vendors of India).

WP 3.2.A. – The Pilot Projects have been selected based upon their climate effectivity, transferability and their potential for upscaling. For this purpose, the framework conditions and prerequisites of the Pilot Projects are being examined in detail. If these exist in the context of other Megacities, the chances of multiplying effects through upscaling and transfer are very high. If the certification system, based upon the Energy Smart Model (ESM), is successful at the local level in Hyderabad and the regional level in Andhra Pradesh, its implementation at the national level can be pursued.

The already existing structures for ISO 9000 can serve here as an example, and these experiences can be used so as to transfer an appropriate Monitoring System. The enforcement mechanisms must be expanded and infrastructure for external certification facilities need to be established. In that event, training of stakeholders and actors plays a key role and Capacity Building has to be upscaled. Through upscaling, the certification can be easily transferred to Megacities within India.

WP 3.2.B – The main output of the WP is a Transport Model and an Assessment Method as a base for planning towards the development of an energy efficient transport system. After the research questions have been answered and methods have been found during the course of the project, these could be adjusted for the dynamics of quickly growing cities with sparse data availability. For such cases, the results are not only transferable to all large cities in India, but also to dynamic Megacities all over the world. The WP's small-scale Pilot Projects (with participatory approaches) towards improvement of the traffic situation are in principle transferable. However, local problems, sensitivities and decision-making structures have to be analysed anew and, if necessary, other forms of cooperation have to be found.

WP 3.2.C. – The Food-Water-Energy-Environment Nexus quantifies interdependencies between the water sector and the energy field and incorporates rural-urban linkages into the analysis. The findings will be used to initiate Capacity Building measures and Pilot Projects. So as to ensure upscaling of the findings and project measures, close cooperation with the CGIAR Institutes² ICRISAT (International Crops Research Institute for the Semi-Arid Tropics) and IWMI (International Water Management Institute) is under way to ascertain local conditions and reveal the limitations of transferability. Through incorporating local expertise and past projects, the action strategy for Capacity Building and Pilot Projects is being developed in two different ways. The first approach serves the implementation phase at the site, taking local conditions into consideration. Out of this, a procedural model is being derived which aims at transferability to other

² The Consultative Group on International Agricultural Research (CGIAR), established in 1971, is a strategic partnership, whose 64 members support 15 international Centers, working in collaboration with many hundreds of government and civil society organizations as well as private businesses around the world.

Megacities and urban agglomerations. For this purpose, cooperation with the Megacity Project in Lima is envisaged.

WP 6 – All Megacities like Hyderabad are confronted with the problem of high greenhouse gas emissions. At the same time, mitigation of climate change impacts is not often a priority with the people and governments of such cities. Consequently, communication and participation methods are needed for all Megacities, so that consciousness about the impacts of climate change and possible mitigation and adaptation strategies can be increased and behavioural changes can be promoted which are climate friendly. Therefore, the transferability of developed participative and communicative processes to other Megacities is a key issue. The initial conditions for participation and communication methods in India can be rated as favourable compared to some other Megacities, as participation and dialogue are well known in the Indian democratic set up. WP 6 would offer consolidated findings and experiences on participative methods concerning targeted emission reduction and adaptation strategies for climate change in a Megacity. Through close cooperation with other Megacity Projects, these findings could be further developed and made available for other Projects (taking relevant cultural, religious, civil society or structural contexts into consideration).

WP 7 – The compiled research results on buyer behaviour of consumers and towards CO₂ emission within the traditional trade, towards increasing the competitiveness of traditional low-emission retail formats through cooperative models and Pilot Projects are universally aligned and can be transferred to other Megacities. The displacement of traditional and small-scale retail trade forms through organised retail trade and supermarkets is a worldwide phenomenon (see Reardon, T. and Gulati, A. 2008). Like the family-run “Kirana” grocery store format in India, “mom and pop” shops in Latin America or Africa likewise fulfil favourable socio-economic functions and have similar climate-relevant implications. Also in other parts of the world, mom and pop shops are characterized by short distances to their customers. The positioning of affected stakeholders and their hierarchical bearing in the relevant societies may vary as well as their readiness for cooperation – often dependent on ethnic, religious, and socio-economic conflict lines – and their knowledge and attitudes towards climate change. The project seeks to disclose such variables so as to ensure the transferability of the cooperation model.

The project Consumer Cooperatives in the *energy sector* is also universally oriented. Problems with energy supply are a characteristic of Megacities worldwide. Purchasing, accounting and maintenance associations of flat-owners or flat-tenants, neighbourhood associations or small enterprises exist worldwide. Requirements for the transferability of the project approach certainly include the guarantee of adequate freedom in designing of private energy production and the foundation of cooperatives through appropriate legislation. Hurdles for the implementation of Consumer Cooperatives in the energy sector are therefore awaited, primarily from the level of institutional setting. Also the cultural and socio-economic aspects have to be considered. A Cooperative can only sustainably exist if adequate willingness and confidence of the people towards such cooperation exists. Therefore, preliminary studies are needed, for example on social capital, so as to verify the transferability of the model to other Megacities.

3. Project Management, Project Communication and Cross-Project Activities

3.1 Project Management and Project Communication

The focus on climate and energy efficiency has affirmed the priorities of the Hyderabad project. Clear working processes and procedures have been defined (see part 1 of the report) and communicated. Complexity has been significantly reduced by the common scenario process: only the most important intervention points, indicators and framework conditions with respect to climate and energy efficiency have been retained. A transparent and consistent Communication, Monitoring and Evaluation System has been put into place in order to handle the remaining complexity (see Deliverable 2009 /RESS/Nr.17).

Internal Communication, Monitoring & Evaluation

The internal communication processes are closely tied up with the Monitoring and Evaluation System (M&E). The most important steps of this system are:

1. *Steering Committee Meeting I*: Composition of a „Logframe—at the start of each Milestone year (May), wherein the yearly activities and outputs of every WP that is to be achieved with respect to the common goal of the project (climate and energy efficiency) are clearly defined (see part 1 of the report). Towards this aim, the criteria of the project management agency (DLR) will be operationalised by developing transparent indicators. The Scientific Advisory Body will meet at this occasion.
2. *Steering Committee Meeting II*: Review of the progress of the project after 6 months.
3. *Peer Review Process*: Internally conducted at the latest 2 months before the due date (May of each year), in order to examine the quality of the work with respect to the common goal.
4. *Conversion of the Results into publications*: See Dissemination Strategy – 2009/RESS/Nr. 16.
5. *Jour Fixe*: A monitoring process will accompany the process by holding regular jour fixe (every three weeks) by means of telephone/web conferences. All WP leaders and the overall coordinators will take part. During these jour fixe, project activities can be coordinated, methodological and process questions be dealt with and problems in the development of the project identified. On the basis of this regular monitoring process, meetings of the Project Management Board can be set at all times.
6. *Evaluation by external Stakeholders in Hyderabad*: This process is being designed at the present moment.

In this way, internal project communication is being institutionalized in a stringent manner. The new and innovative communication software Collanos (www.collanos.com) is being used by the project participants (German and Indian) in order to support these processes. This software allows decentralized communication and information management and occupies a central position in the M&E system. The software has become a central tool and significantly promotes integration of the project participants.

The project's presence on site in Hyderabad has been reinforced. Dr. Ramesh Chennamaneni will spend most of the time in Hyderabad in order to coordinate and implement the project's activities. A second Indian postdoc (financed by DAAD – German Academic Exchange Service), who completed his doctoral dissertation at Humboldt University's RESS and who is perfectly familiar with the appropriate methodological and empirical concepts, will also be on site in Hyderabad on a near-permanent basis in order to carry out necessary research. Our Indian partners and stakeholders have therefore permanent, direct contact persons in Hyderabad. The German-Indian interaction and communication is furthermore being enhanced and institutionalized by the newly opened project house, which significantly facilitates the organization of uniform data acquisition activities, workshops as well as of Capacity Building measures and Pilot Projects. In addition, a considerable number of project staff (postdocs, doctoral and master students) will spend long periods of time in Hyderabad in the framework of their respective research and contribute to the operation of the project house. It is expected that the project house will become a source of creative and innovative activities. Even more so because the operative capacities of the project have been significantly enlarged through the DAAD programme „*Study and Research Scholarships of Today for the Megacities of Tomorrow*“, through which approximately 4 masters students, 10 doctoral students, 3 postdocs and 8 senior research scientists will join us.

3.2 Cross-Project Activities

Approach for cross-project data management in the framework of the BMBF programme Megacities of Tomorrow. Approaches for cross-project data management were explored during a workshop in January 2009 at the project management agency DLR in Bonn. The Hyderabad project – together with the Ho Chi Minh project – contributes a tool that allows for cross-project exchange of information related to Institutions and rural/urban spatial planning. Bilateral meetings for the development of this tool have already taken place.

Doctoral network of the BMBF programme Megacities of Tomorrow. During this same workshop it was decided to create a cross-project doctoral network. Ms. Audrey Dobbins of the Johannesburg project has developed an appropriate concept and Ms. Jennifer Mayer-Ueding, a doctoral student from the Hyderabad project, will serve as contact person for this network. The Hyderabad project expects from this network a vibrant and mutually beneficial exchange between the projects. Further, RESS at Humboldt University has applied for a European Doctoral School within the framework of the ERASMUS MUNDUS II Programme that envisages a structured PhD training which would be open for all doctoral students of the Megacity projects.

Cross-project Pilot Projects. The Hyderabad project has deepened and intensified contact with the working group Urban Technologies in order to explore the possibility of implementing common pilot projects. Part of an initiative Strategies for Innovation and Knowledge Management launched by the Federation of German Industries (BDI), Urban Technologies was formed in 2006 as part of the High-tech Strategy of the German Federal Government and is composed of companies from the energy-producing, -distributing and -building sectors. Feedback has been very positive and there is among these companies an affirmed interest in common Pilot Projects. Together with the Megacity project “Young Cities in Iran”, chaired by Prof. Schäfer from the Technical University of Berlin, a workshop is planned for Fall 2009 during which the Megacities projects will present their planned Pilot Projects to the working group Urban Technologies and other representatives from the private sector, so that first operational steps can be discussed.

3.3 Scientific Advisory Body

The Hyderabad project is very proud to welcome as member of the Scientific Advisory Board the following distinguished experts from the areas of Environmental Economics, Institutional Analysis and Development Cooperation:

Prof. Dr. Dr. h.c. mult. Elinor Ostrom

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The main task of the Scientific Advisory Board is a yearly review of the project's progress and, based on that, the formulation of practical and research-related advice for future project activities. The scientific advisory body meets at the same time as the Steering Committee.

3.4 Modifications/Additions to the Work Plan (see Annex 4, Milestone Plan)

The following modifications are to a great extent a consequence of the late start of the main phase of the project³. The project would also like to propose certain additions that are the result of new findings from research activities carried out in Hyderabad.

WP 2.1 - Lifestyle Dynamics, GHG and Climate Change (PIK)

- While carrying out desktop research, stakeholder discussions and working with TERI, it became clear that Task 3 (emission sector analysis and policy scenarios) will not be completed in Q3, but will go on until Q6. The main reason is the complicated data situation with regard to urban emissions.
- In addition to the tasks listed in the original application (see section 2.4.2), WP 2.1 contributed and will continue to contribute significantly to the common scenario process in order to further the climate mainstreaming process. It is to be expected that this additional activity will last until Q 18.
- Together with TERI and WP 3.2.A, it is currently being investigated whether a modelling component will be integrated into the common scenario process in order to support it.
- The analysis of relevant media will continue for another 3 months in order to give an exhausting overview of climate discourse

3.2.B. - Traffic Planning (PTV). Following the recommendations of the project reviewers, the development of concepts for pilot projects was already begun in Q2 instead of Q9 in order to enhance their implementation and strengthen the integration of local stakeholders regarding small-scale traffic management schemes on the neighbourhood level, as described in Deliverable 2009/PTV/Nr. 11. Furthermore, it is expected that the concept for the assessment procedure for the strategic planning tool will be available by the end of July. This means that it will be available ahead of the planned PTV schedule (original due date being one year after the start of the project), but slightly after the Milestone in May 2009.

³ The formal starting date of the project was July 1, 2008, but the approval for funding became effective in October 2008, so that only then could job advertisements be posted and appropriate personnel be recruited. This process was completed in early January 2009. This left effectively only 4 1/2 months to prepare the Deliverables.

3.2.C. - *Food-Water-Energy-Environment Nexus (RESS)*. The work plan of WP 3.2.C envisaged only an explorative phase of the topic, followed by Capacity Building measures. After Meetings with TERI and the KfW it became clear that there is strong interest in implementing and co-financing Pilot Projects in the area of energy efficient water provision. In the event of a favourable reply of the DLR to this additional activity, the task will be realized together with Work Package 3.2.A.

3.2.D. - *Industrial Pollution: Abatement Policy and Implementation (RESS)*. Because of the late start of the project there has been a delay in the treatment of the WP on Industrial Pollution: Abatement Policy and Implementation. This topic will be treated by a postdoc who will be financed through the DAAD Programme „Study and Research Scholarships of Today for the Megacities of Tomorrow–Activities will start from Q4 onwards.

WP 5. - *Institutions and Governance in Natural Resource Management (RESS)*. According to the Milestone plan, a Deliverable is due for this WP in May 2009. This, however, is a formal mistake. In accordance with the analytical steps of the project the Concept papers can only be developed after completion of the Background Studies and Stakeholder Analyses, which have themselves been prepared for Milestone 2009. The first Deliverable of this WP is therefore to be expected for May 2010.

WP 6 - *Participation and Communication Strategies (NEXUS)*. The time- and work plan has been adapted as follows to the delayed project start:

- The development of interactive tools for the project website only commenced in January 2009. At the present moment, the Online-Dialogue „Ready to Move – Towards Climate Friendly and Energy Efficient Transport and Traffic Solutions” is running on the website.
- The necessary activities towards formulation of the stakeholder analysis and the fundamental study only started in December 2008. Nevertheless, they will be completed by May 2009.
- The task „Participatory Transport Management” has started earlier than originally planned (November 2008 instead of July 2009). Activities include a Citizens Exhibition, put on together with the Tarnaka Residents Welfare Association, and a conference on „Urban Transport” in cooperation with the Goethe Center (Association for German Culture).

WP8 – *Knowledge based Action Plan, Institutional Innovation and Governance (RESS)*. The component *Attaining Political Commitment*–which is an integral part of the overall implementation strategy of the project, has been strengthened by the integration of the multiple actor approach *Crafting Rules by Discourse* (CRD).

With the agreement of the project management agency DLR, the Hyderabad project will integrate these modifications/additions in the overall work and Milestone Plan.

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ANNEXES

Annex 1: Emission drivers and Impacts of Climate Change on Hyderabad

Figure 1: Lifestyle Impacts on Transport, Infrastructure Systems and Related Emissions

Figure 2: Lifestyle Impacts on, Energy, Water Industries, and Related Emissions

Figure 3: Lifestyle Impacts on Food and Health Systems and Related Emissions

Figure 4: Climate Impacts on Transport and Infrastructure

Figure 5: Climate Impacts on Water, Energy and Industry

Figure 6: Climate Impacts on Food, Nutrition and Health

Annex 2: Application orientation and Implementation processes - Stakeholder and Partner Maps of the Work Packages WP1 to WP7

Figure 1: Stakeholder and Partner Map of Work Package 1

Figure 2: Stakeholder and Partner Map of Work Package 2.1

Figure 3: Stakeholder and Partner Map of Work Package 2.2

Figure 4: Stakeholder and Partner Map of Work Package 3.2.A

Figure 5: Stakeholder and Partner Map of Work Package 3.2.B

Figure 6: Stakeholder and Partner Map of Work Package 3.2.C

Figure 7: Stakeholder and Partner Map of Work Package 6

Figure 8: Stakeholder and Partner Map of Work Package 7 (Food, Nutrition)

Figure 9: Stakeholder and Partner Map of Work Package 7 (Energy)

Annex 3: Reports from the Work Packages

Potsdam Institute for Climate Impact Research (PIK)

WP 1 Climate Change Impacts and Adaptation Measures for Hyderabad

WP 2.1 Lifestyle Dynamics and Climate Change

Institute for Cultural Geography, University of Freiburg (CULT-GEO)

WP 2.2 Food, Nutrition and Public Health

WP 4.2 Health Systems

Division of Resource Economics, Humboldt University of Berlin (RESS)

WP 3.2.A Energy Management for the Emerging Megacity of Hyderabad

WP 3.2.C Food-Water-Environment-Nexus

Traffic Mobility Logistics (PTV)

WP 3.2.B Traffic Planning

Institute for Cooperation Management and Interdisciplinary Research (NEXUS)

WP 6 Participation and Communication Strategies

Berlin Institute for Cooperative Studies, Humboldt University of Berlin (IfG)

WP 4.1 Food and Nutrition

WP 7 Cooperation, Participation and Gender Dimension of Sustainability

Annex 4: Milestone Plan

Annex 1: Emission Drivers and Impacts for Hyderabad

Emission Drivers for Hyderabad

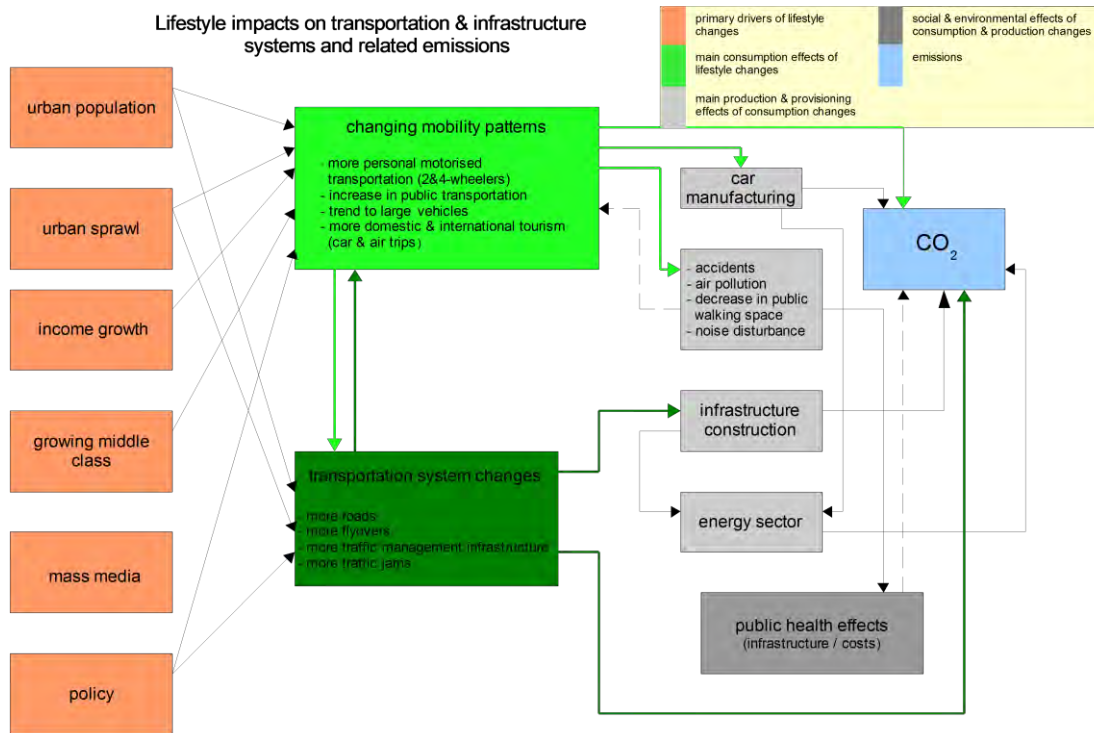


Figure 1 (Source: Reusswig 2009)

Lifestyle impacts on water, energy, industries and related emissions

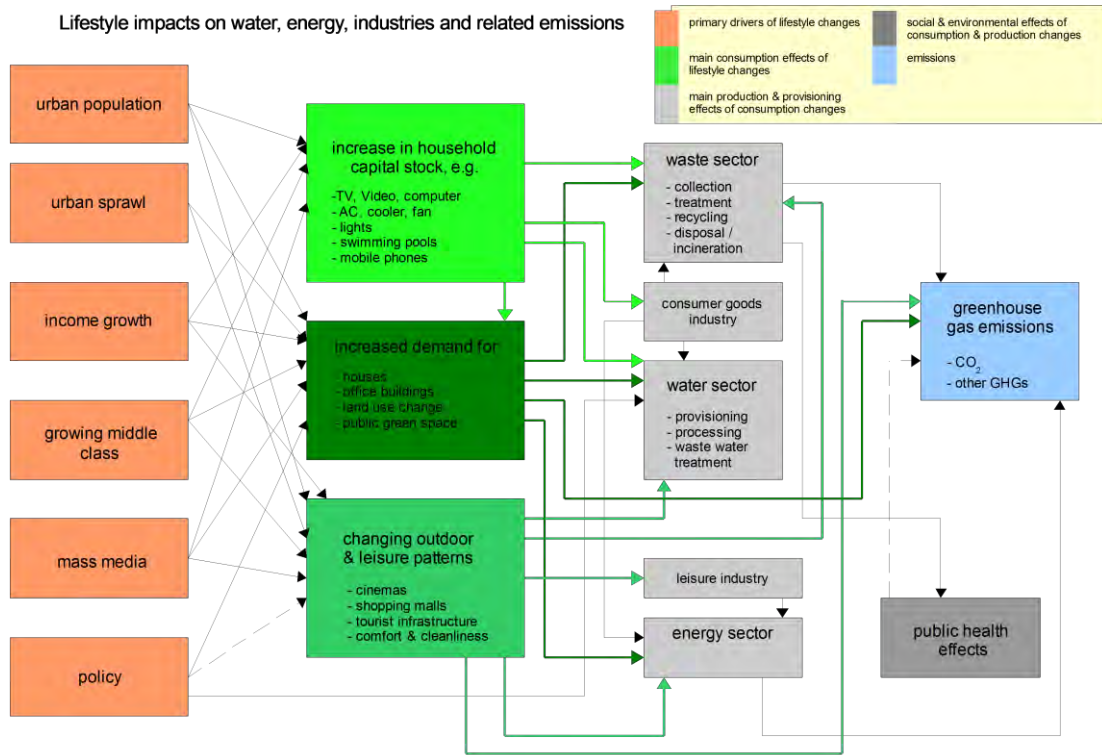


Figure 2 (Source: Reusswig 2009)

Lifestyle impacts on food and health systems and related emissions

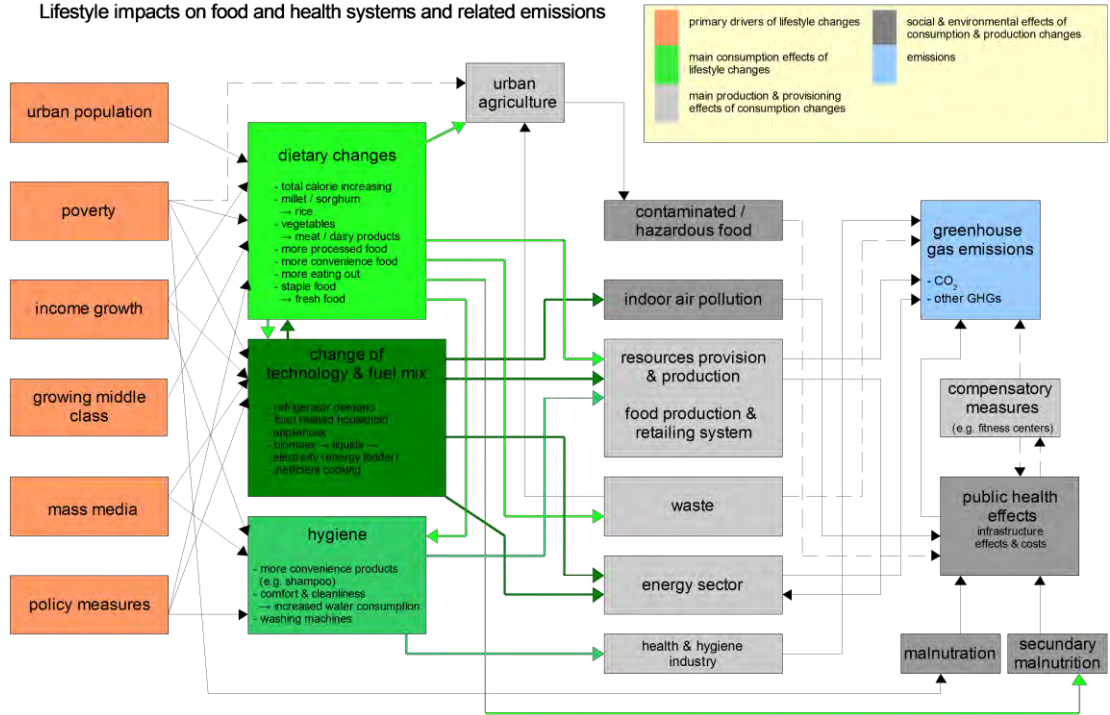
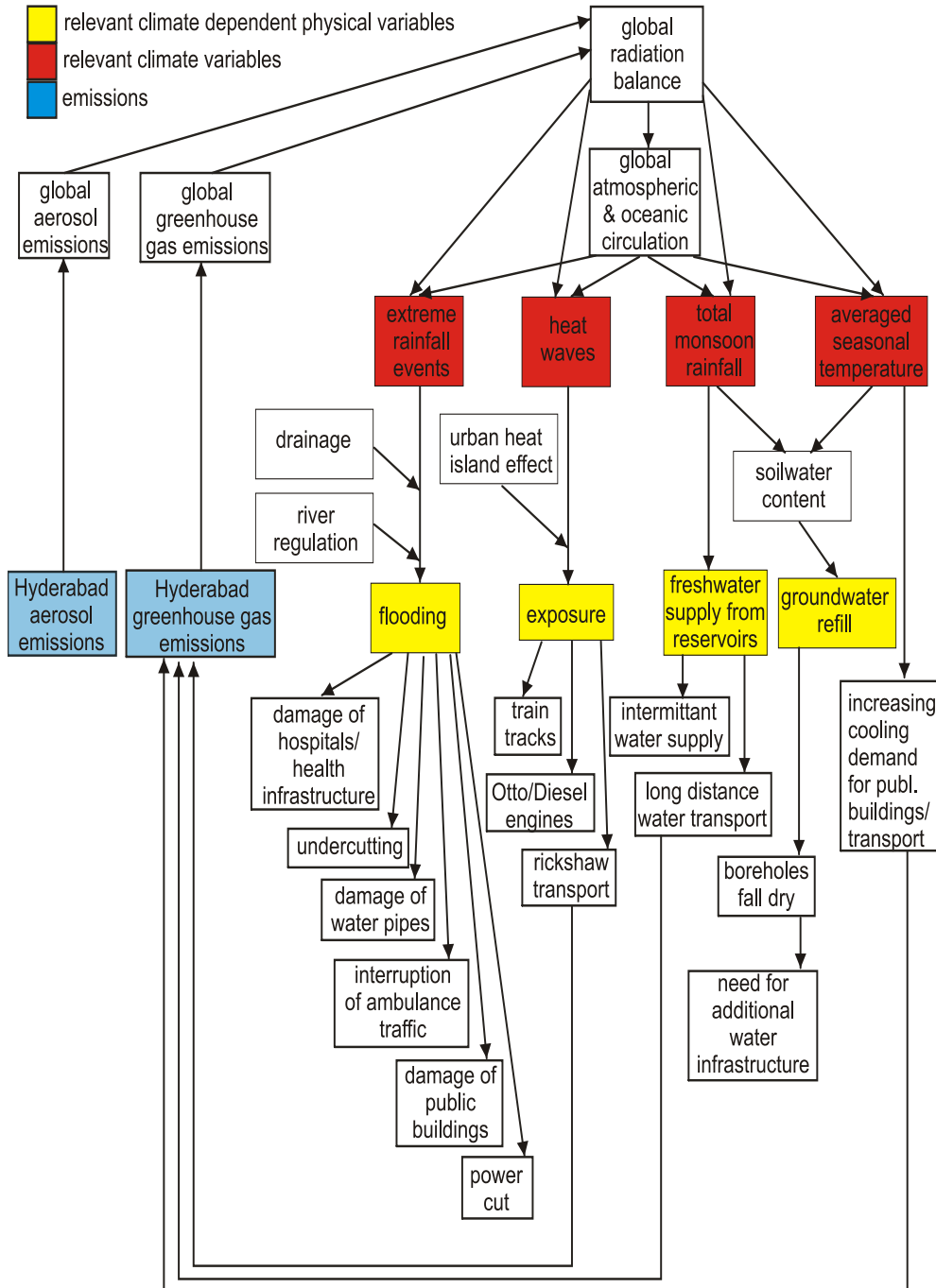


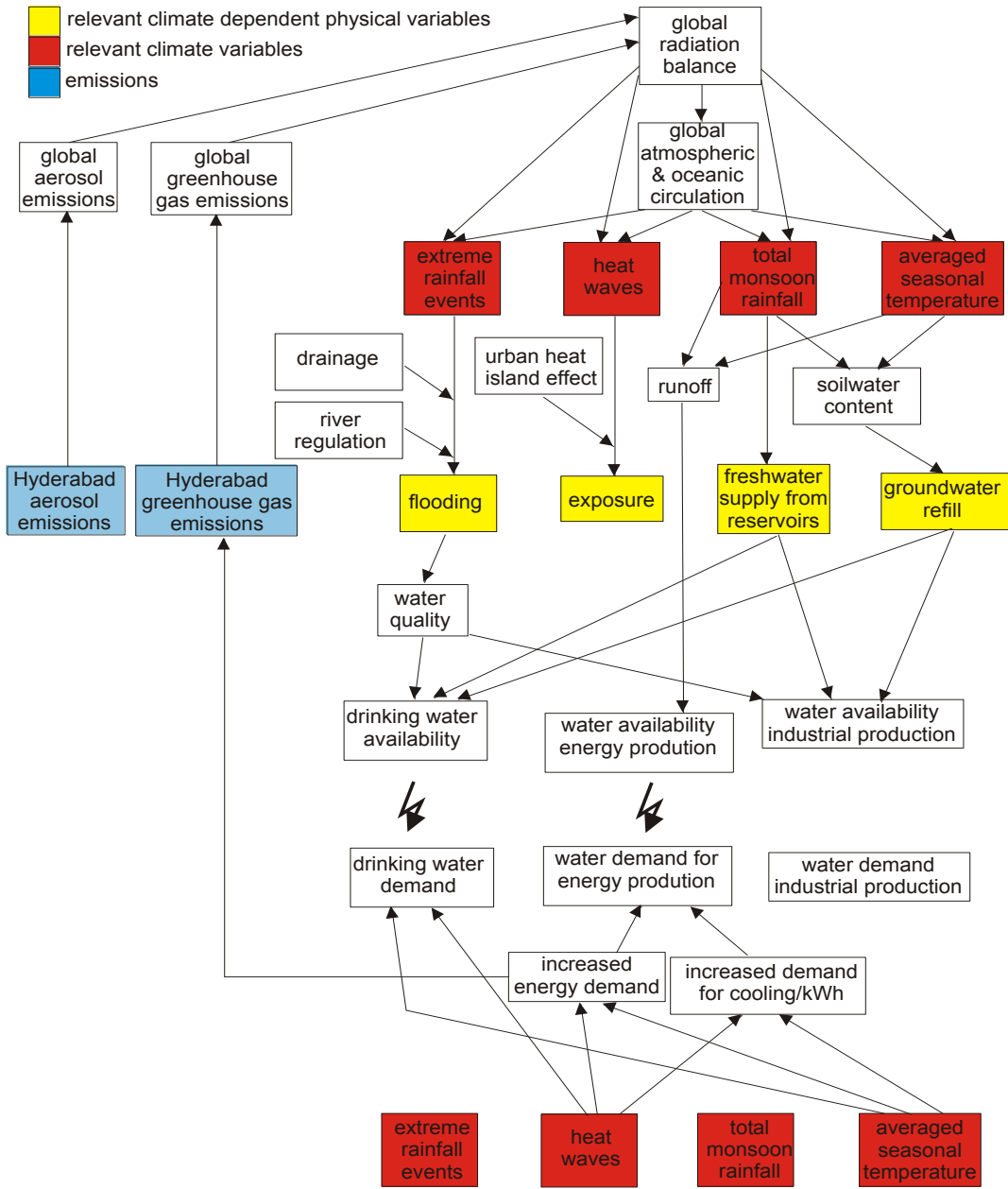
Figure 3 (Source: Reusswig 2009)

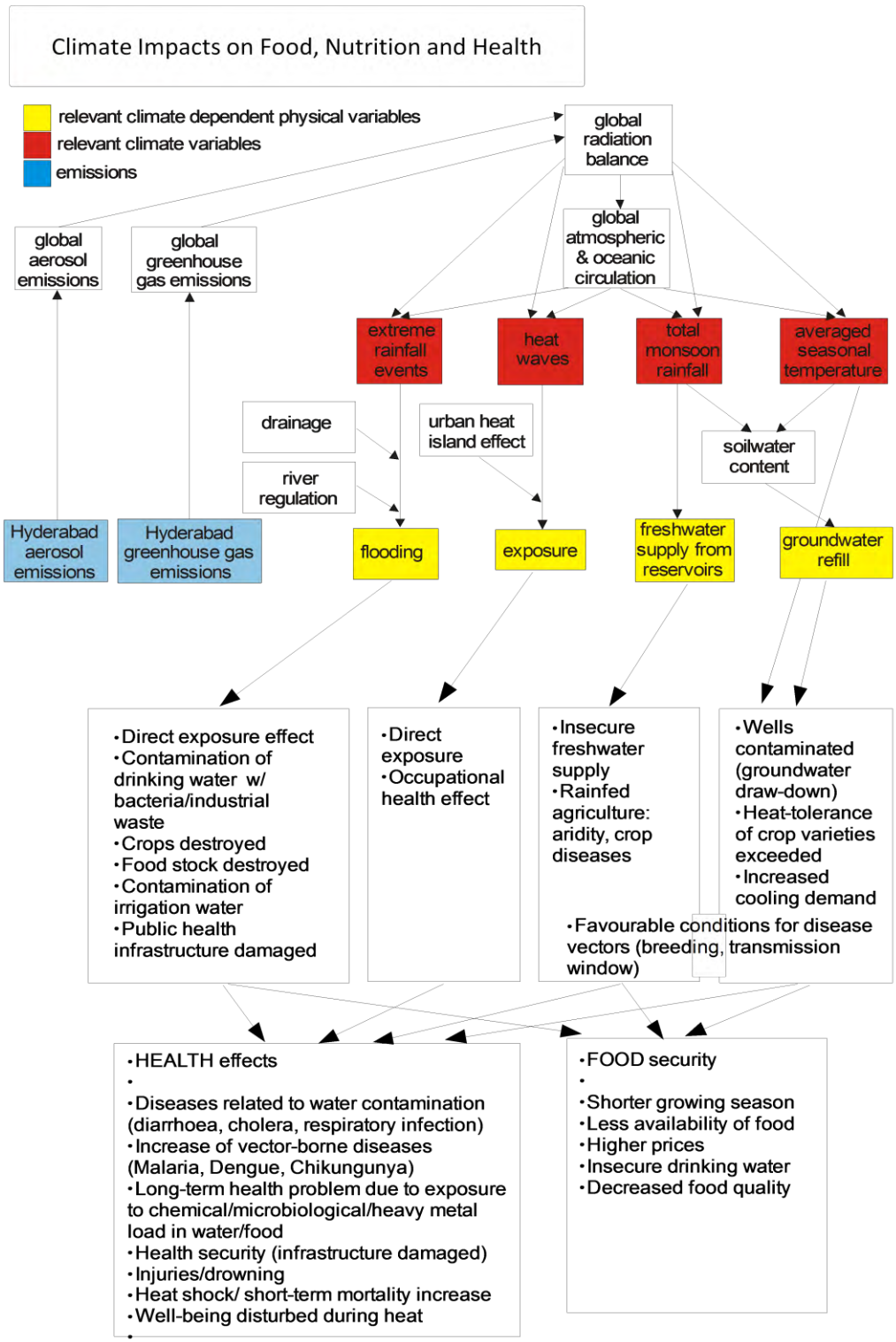
Climate Change Impacts for Hyderabad

CLIMATE IMPACTS ON TRANSPORT AND INFRASTRUCTURE

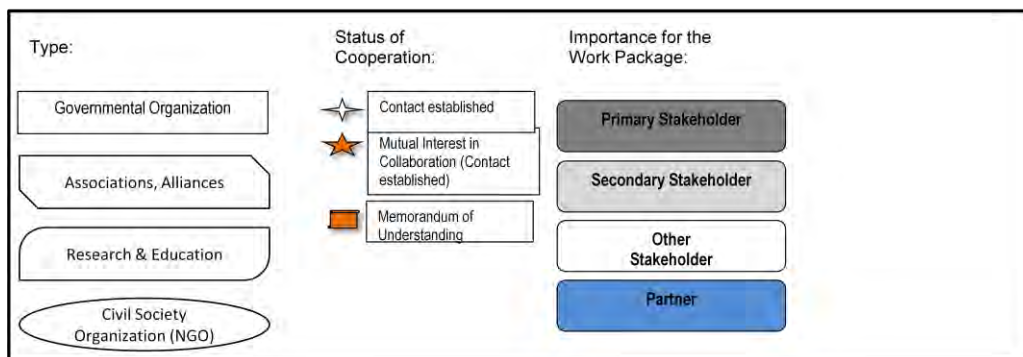
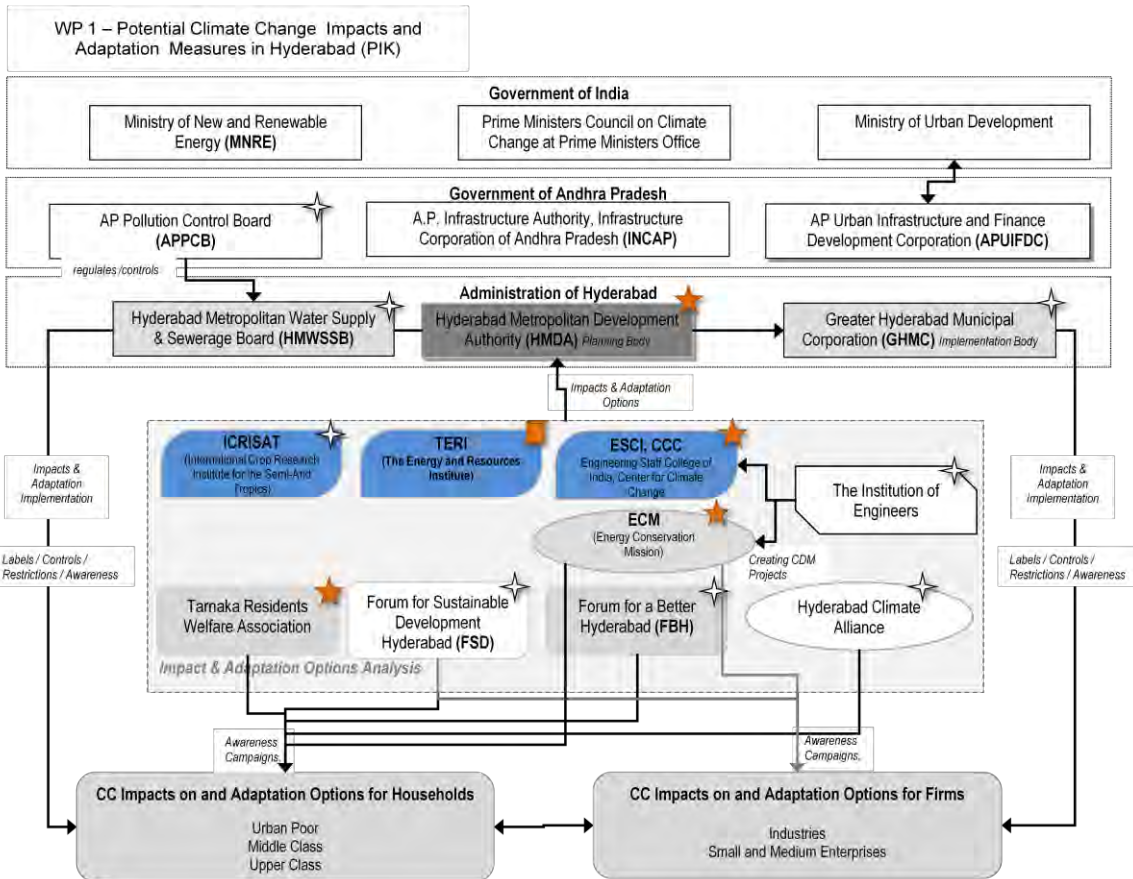


CLIMATE IMPACT ON WATER, ENERGY AND INDUSTRY

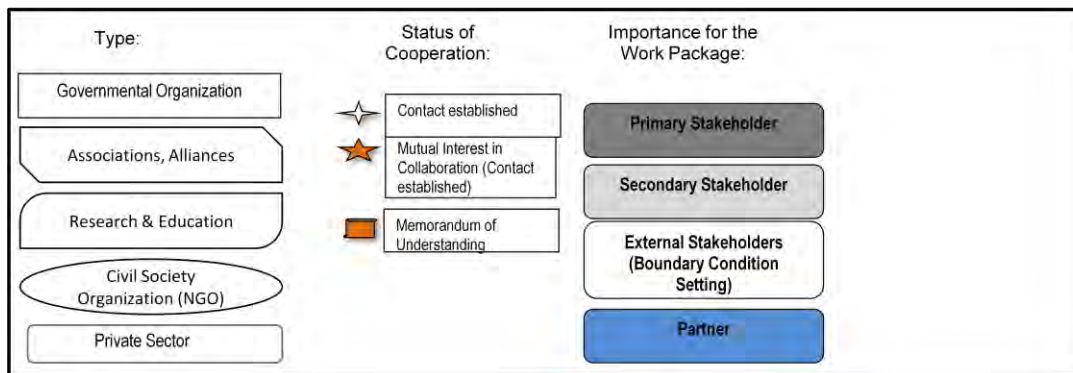
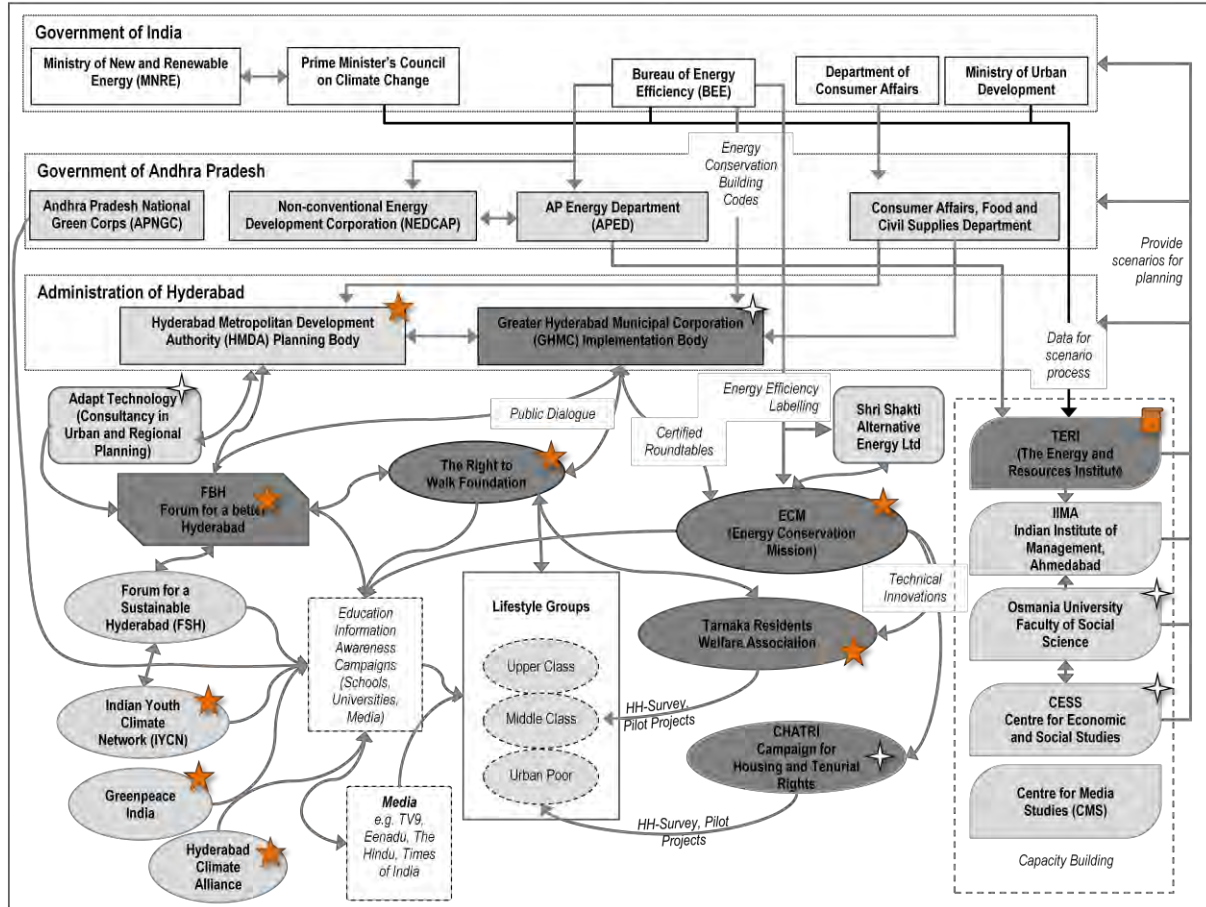




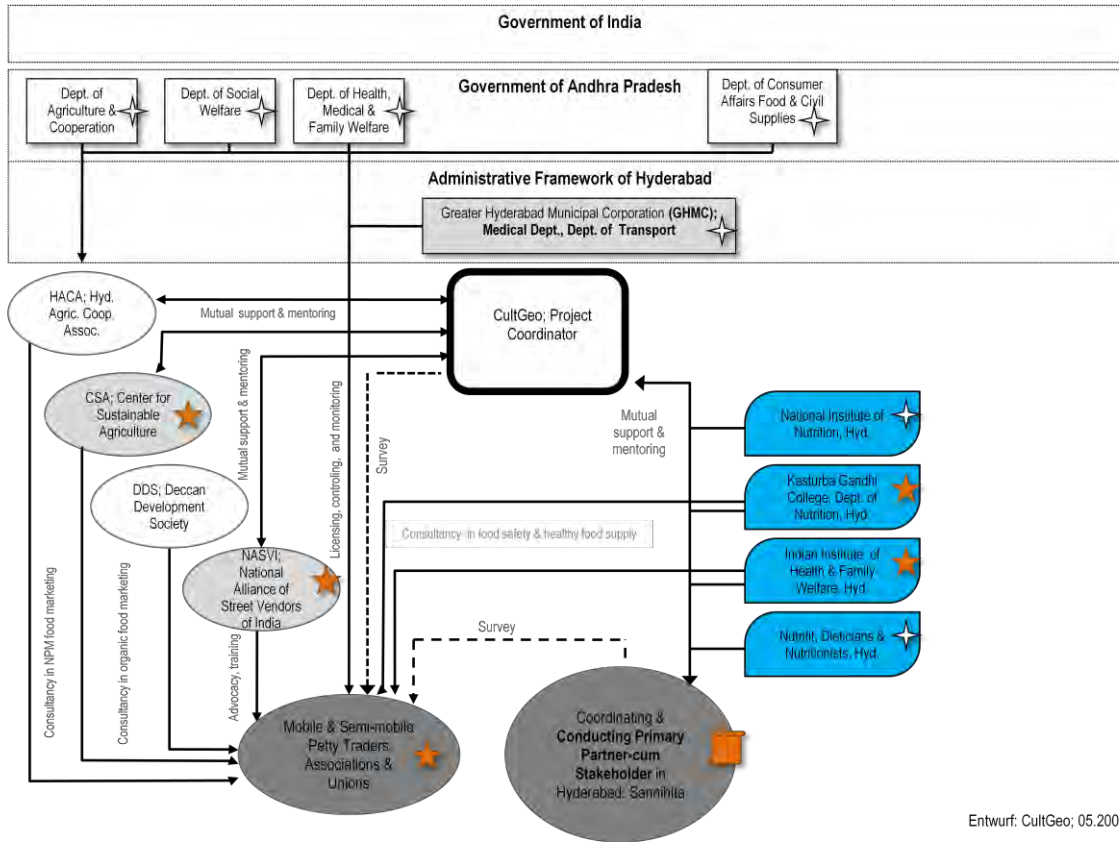
Annex 2: Stakeholder and Partner Maps of the Work Packages WP1 to WP7



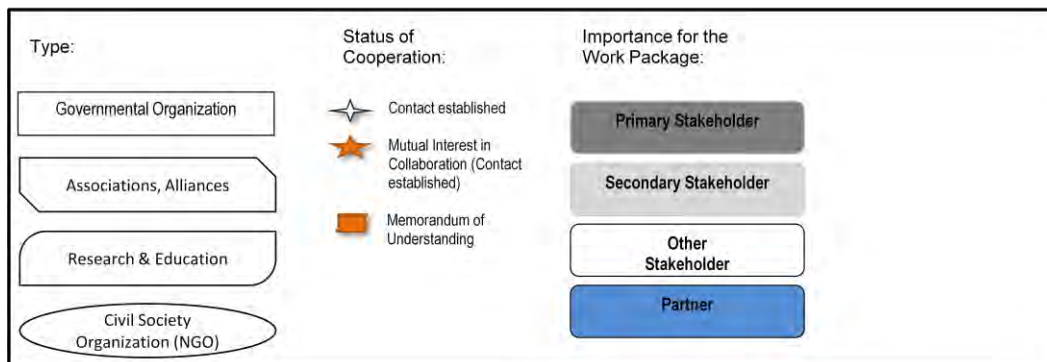
WP 2.1 – Lifestyle Dynamics and Climate Change (PIK)



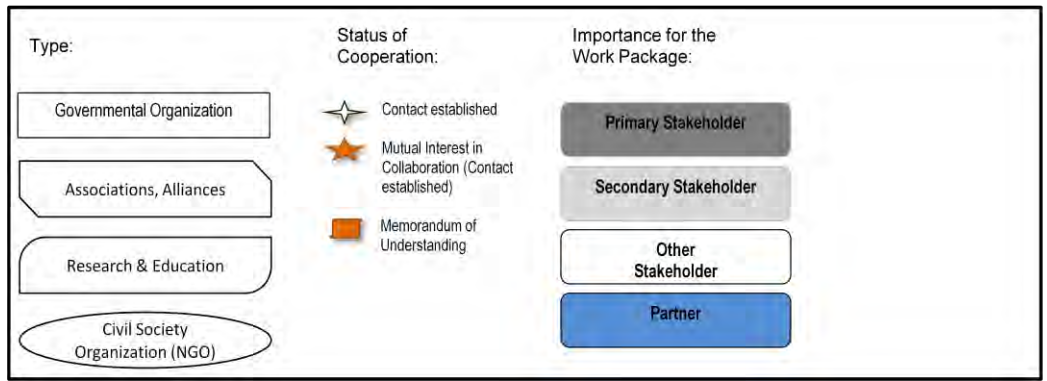
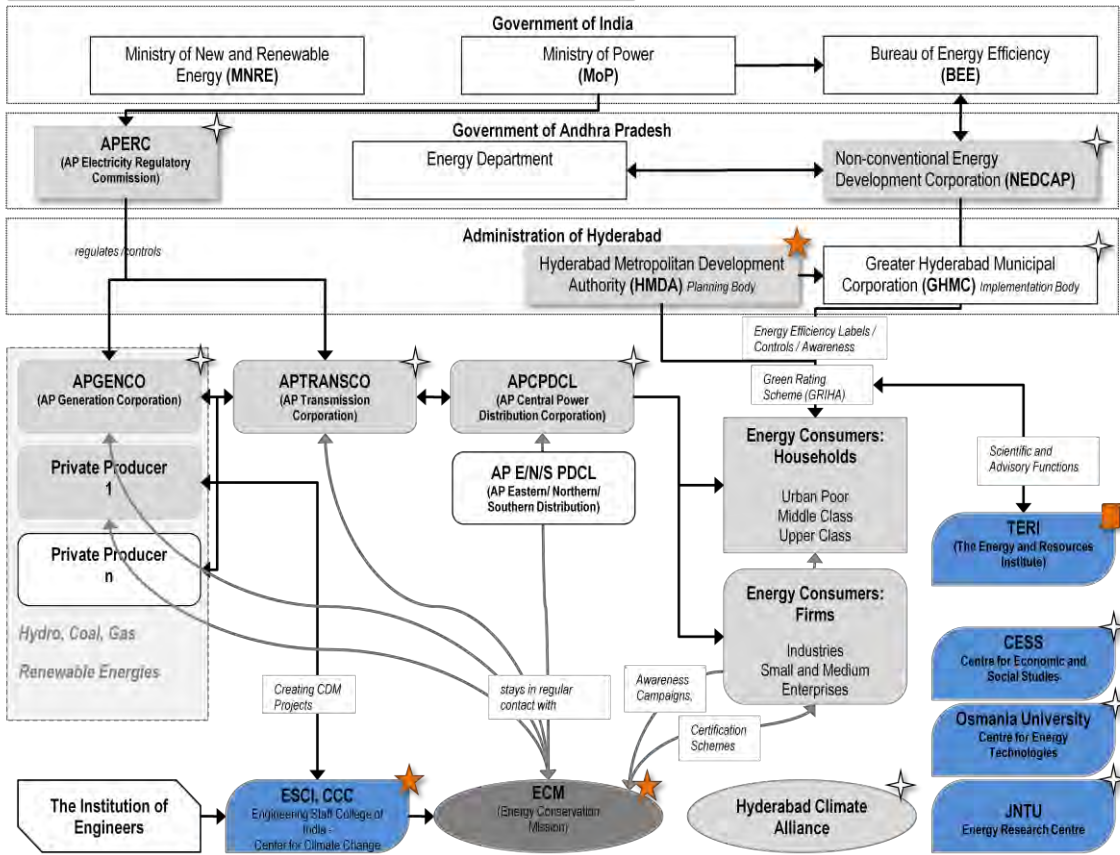
WP 2.2. – Food, Nutrition and Public Health (CULT-GEO)



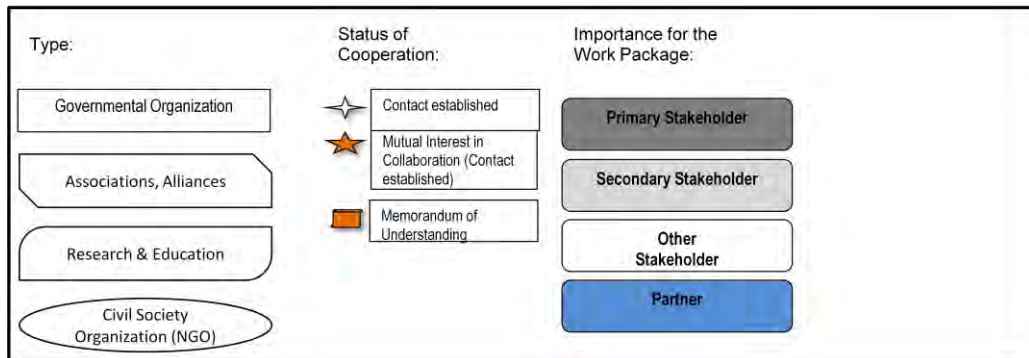
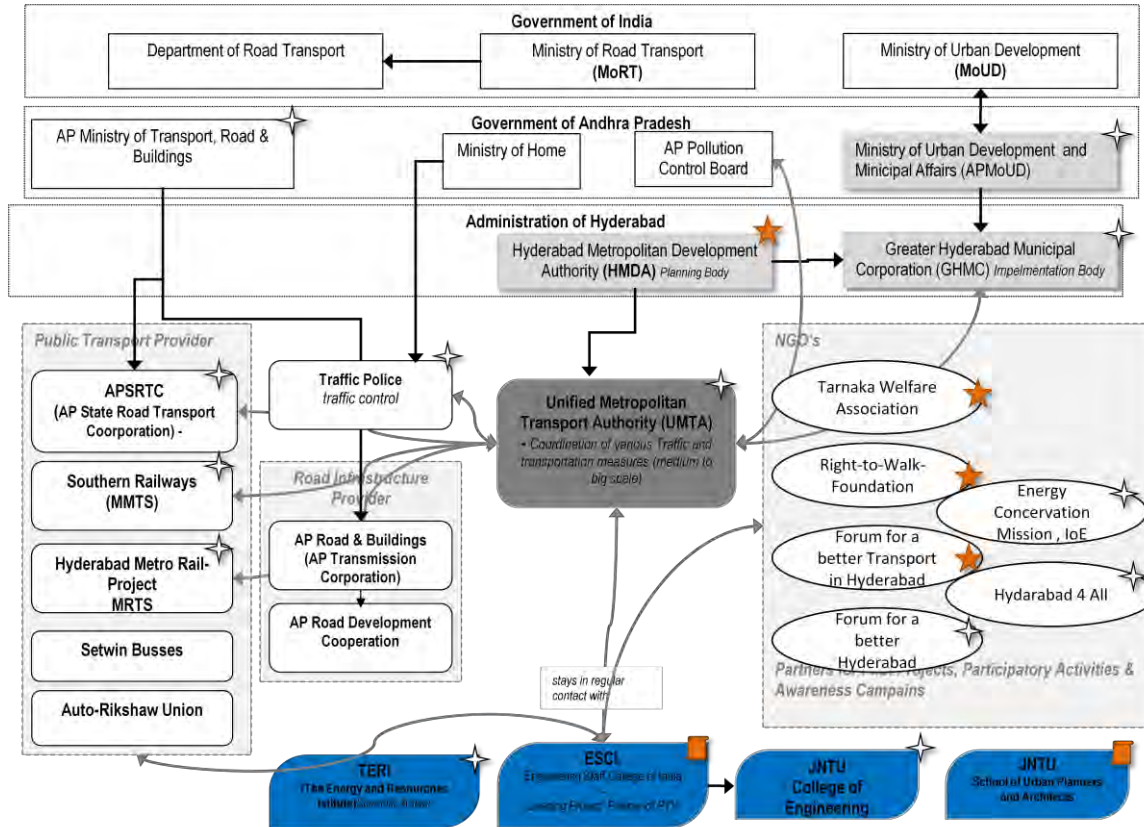
Entwurf: CultGeo; 05.2009

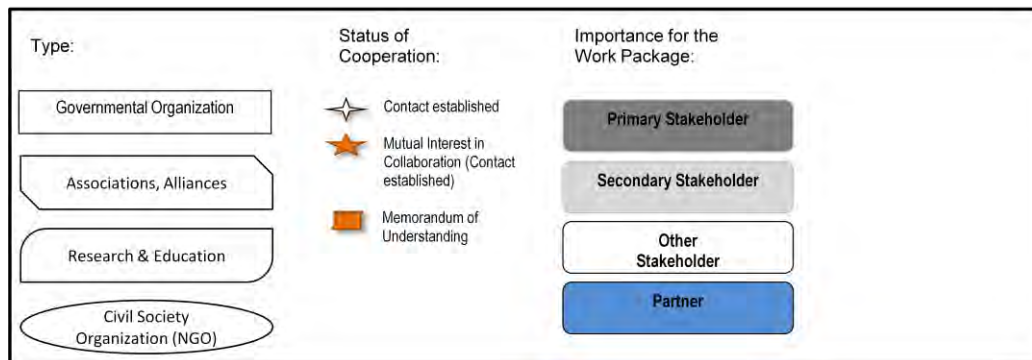
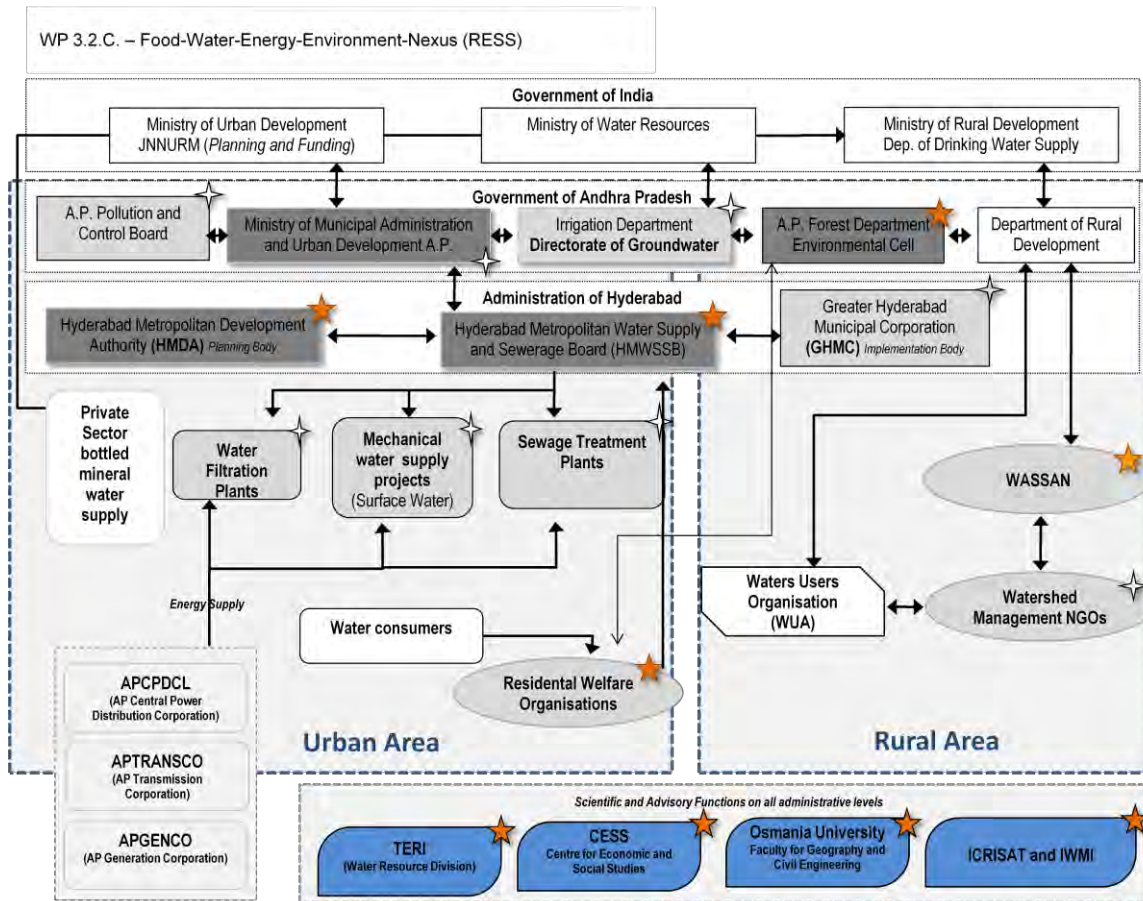


WP 3.2.A. – Energy Management for the emerging Megacity of Hyderabad

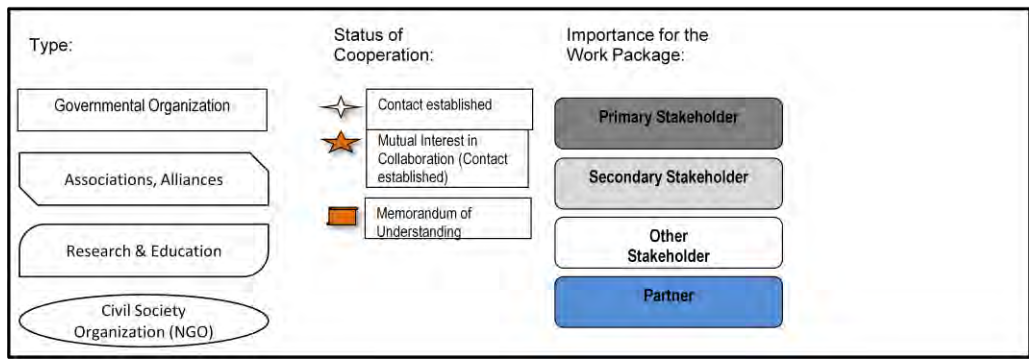
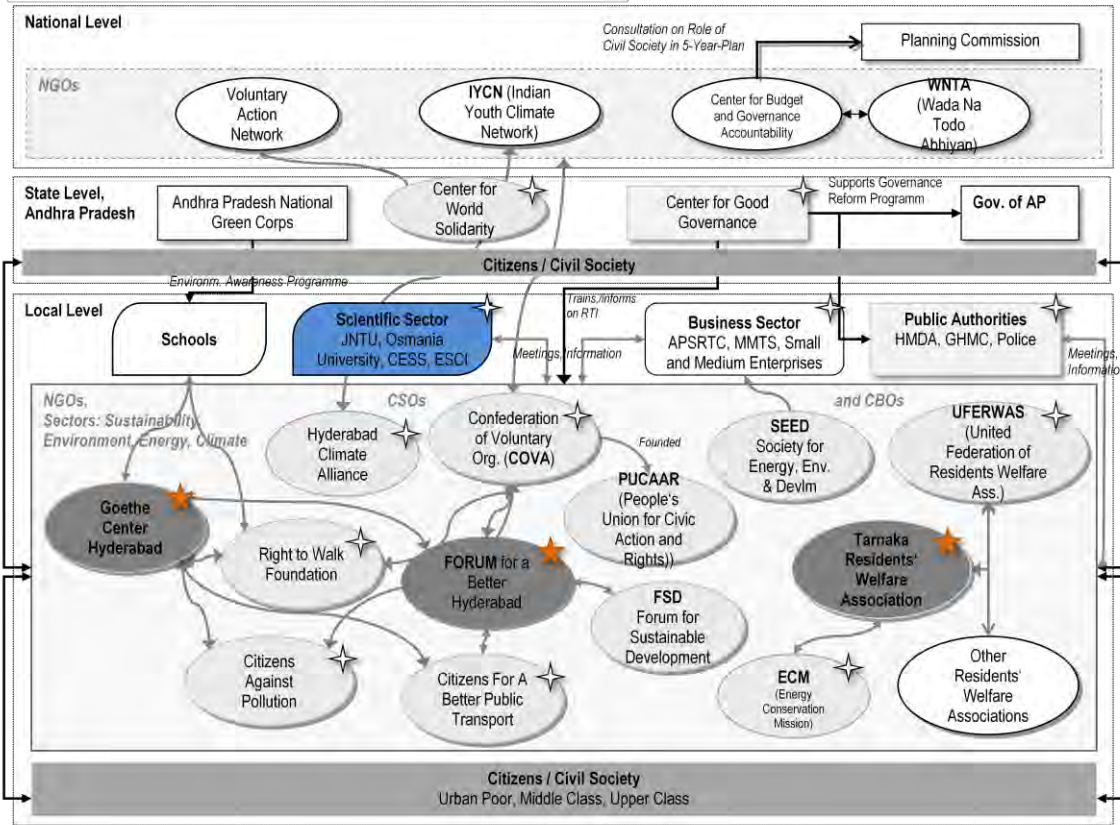


WP 3.2.B. – Traffic Planning (PTV)

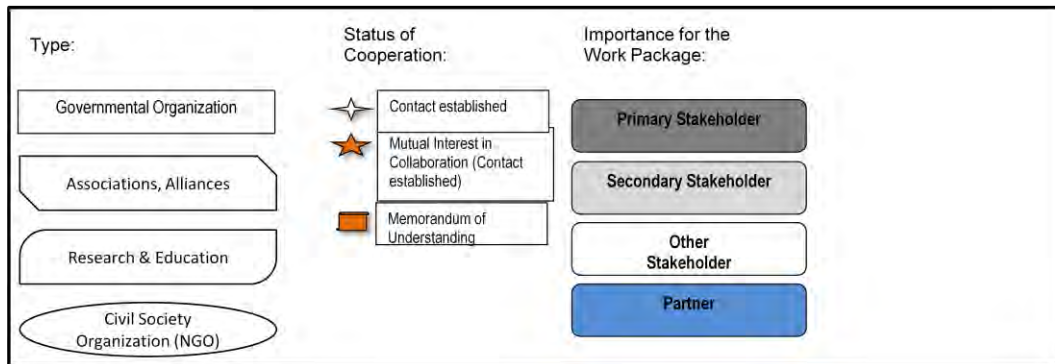
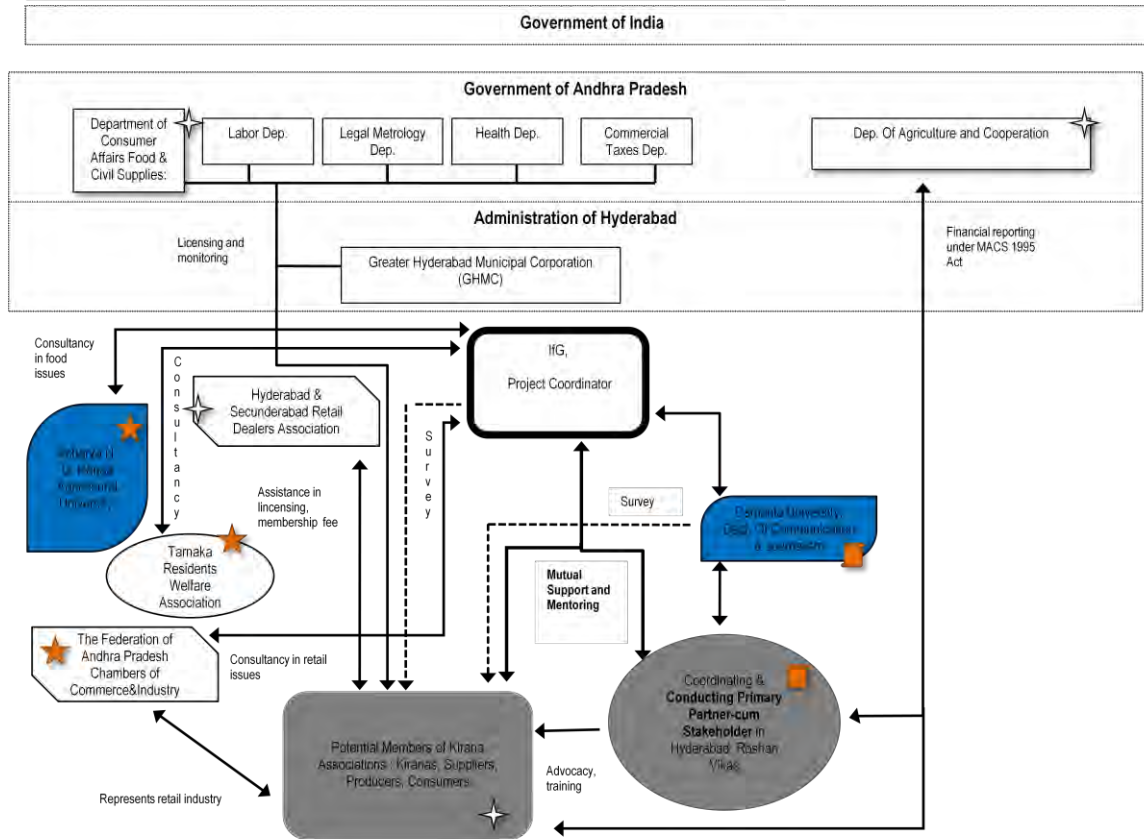




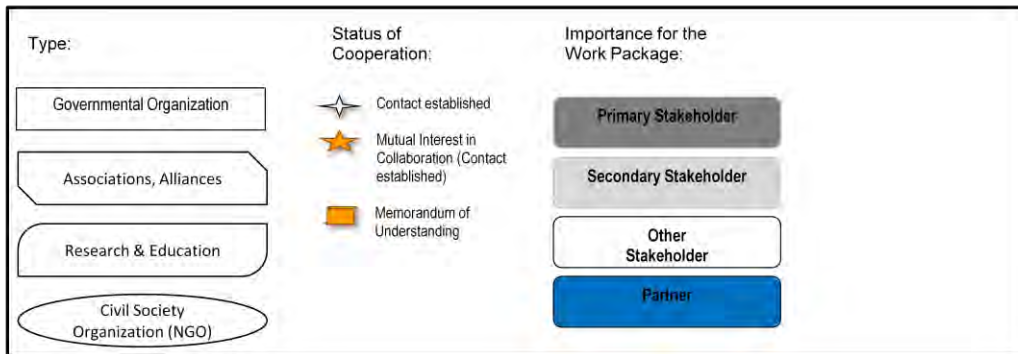
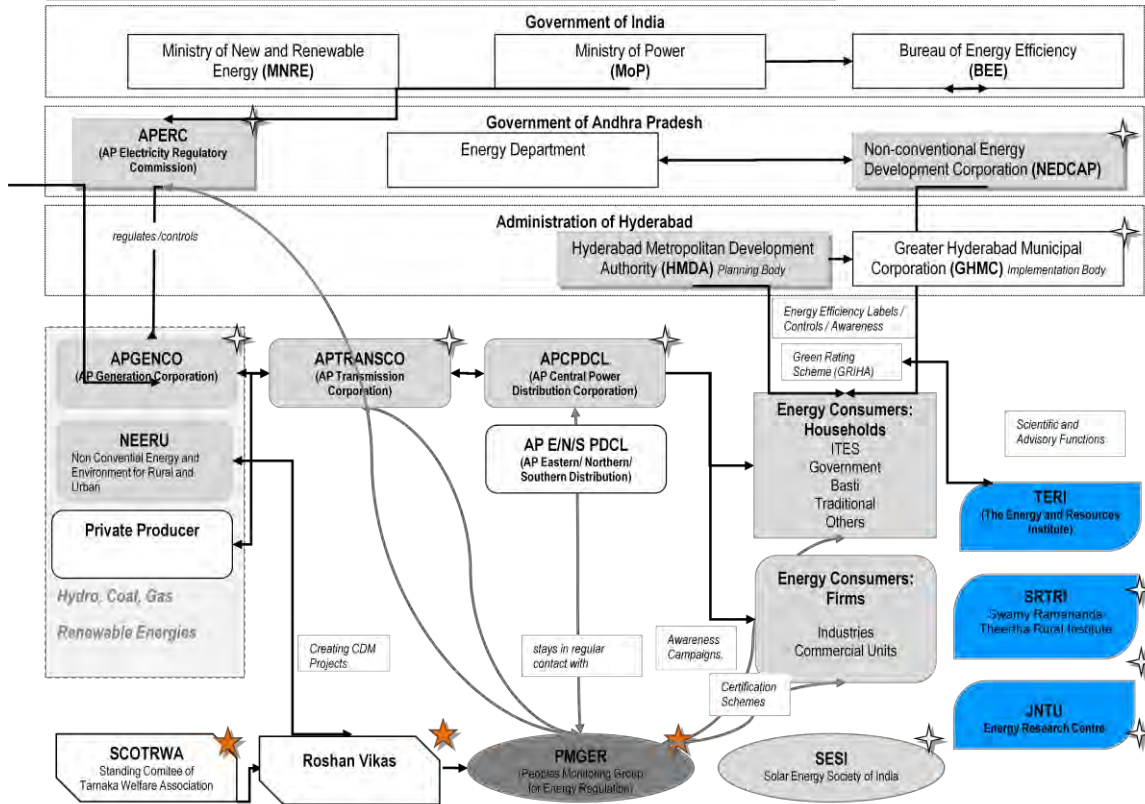
WP 6 – Participation and Communication Strategies (NEXUS)



WP 7 – Cooperation, Participation and Gender Dimension of Sustainability (IfG) - Food Sector



WP 7 – Cooperation, Participation and Gender Dimension of Sustainability (IFG) – Energy Sector



Annex 3: Work Package Reports

Potsdam Institut für Klimafolgenforschung (PIK)

WP 1 – Climate Change Impacts and Adaptation Measures for Hyderabad

1. Scientific Stringency

With respect to the strengthening of the scientific focus of energy and climate, the overall role of WP1 is to enable, foster and assure an adequate assessment of potential future climate change impacts in the research network.

Until the end of the first major reporting period (Milestone Report at the end of May 2009) three main, content-related scientific issues were able to be clarified within WP1 that directly relate to a reduction of complexity. First, since a multitude of statistical variables will be subject to change in a projected future climate, it was necessary to find the most relevant for Hyderabad. Four have been identified: seasonal averages of temperature and precipitation, probability of heat waves and extreme precipitation events. Future project work will concentrate on exactly these four important climate variables for Hyderabad.

Additionally, we achieved to specification of preliminary qualitative climate impact paths for Hyderabad targeted to the thematic issue areas that are analyzed within the research network. This represents an important orientation and joint focus for all WPs. Subsequently, we proceeded in assessing the uncertainty of climate projections and clarified the role of uncertainty with respect to the optimal choice of adaptation options. This is an important methodological step.

Practically, the climate impact and adaptation focus of the project has been strengthened in several ways. An important event in that respect represents the Scenario-Workshop in Hyderabad in February/ March 2009. PIK presented first results of the statistical analysis for climate projections. German and Indian project participants then discussed the significance of particular climate variables, impact paths, and other important content-related issues.

Further, the WP1 results for the four relevant climate variables in future climate projections and the preliminary climate impact paths and nets were provided for all project participants in order to contribute to the focus on climate change within the overall project. A consequence of the focusing activities was the incorporation of questions regarding various aspects of climate change in the questionnaires of the partners.

The establishment and signature of a cooperation agreement with TERI has had a signal effect and strengthens, together with other research partners in Hyderabad (e.g. the Climate Change Center, ESCI), the presence and the urgency of the climate focus.

An important first step for the assessment of feasibility of certain adaptation options was the visit at TERI and the attendance at the DSDS (Delhi Sustainable Development Summit). It was possible to receive first-hand information with respect to the climate debate in India, particularly with respect to the Indian standpoint on climate policy, and to derive important conclusions for the work in Hyderabad. It was a key prerequisite with implications for the formulation of pilot projects and their orientation within the regional urban context of Hyderabad.

In the coming year (until 31st May 2010) WP1 will contribute towards strengthening the climate and energy focus of the project mainly via three core activities. First, the preliminary climate impact paths and networks will intensively be discussed in workshops with project partners and stakeholders in Hyderabad. This will further increase a commitment to the climate change issue and is a valuable and important preparation for the planned, joint adaptation mainstreaming.

Second, the envisaged and soon-beginning (task of the second project year) quantification of possible climate change impacts will enable a ranking of the impact paths and nets and through that, further reduce complexity. Third, discussions on the possibility of building a solar power

plant will continue. PIK will continuously be involved, since such a development has to be in harmony with small scale, spatial projections of climate impacts. One of the next steps is the feasibility study and placing an order for it (probably headed by RESS, WP3.2.A).

2. Applied practice orientation and transferability

Application orientation and transferability of results is at the heart of WP1. It is a central element of the work with CATHY, the quantitative modeling Instrument, as its reference. Intended for continued use also after the project ends CATHY will be handed over to the regional planning office(s) after its implementation as pilot project.

To do so, we will complete discussions on an agreement for the future use of CATHY with the regional planning authorities (GHMC or HMDA). To assure an on-going interest in its use and to guarantee its future usefulness and possibility of utilization, all model aspects will be discussed with and explained to stakeholders and other potential users during dedicated training workshops in Hyderabad. CATHY will, in principle, be transferable to other cities in India and beyond. However, adjustments will have to be taken and will, in amount and detail, depend on the similarity of other cities to the city structure (various aspects) of Hyderabad.

3. Involvement of local actors

With respect of placing the focus of work on problems of the urban poor and the integration of local actors we will develop different qualitative climate impact paths and nets for different social strata and lifestyle groups. Such a focus is immanent in WP1, as consequences of climatic changes will most dramatically affect the poorest people of the society. The separation of qualitative impacts according to social groups will find its counterpart in the quantitative modeling, where a specification according to social groups and strata will be respected and continuously be made visible.

First insights into the needs, aspirations and expectations of stakeholders were obtained at the Scenario-Workshop in Hyderabad in February/ March 2009. The central question was: Which futures do project partners and stakeholders regard as a climate friendly, sustainable development perspective for Hyderabad? Future workshops with stakeholders and partners will complement and deepen this scenario.

4. Involvement of relevant institutions

The planned future application of CATHY directly addresses the consideration and integration of relevant institutions including the analysis of roles, rights and responsibilities of GHMC and HMDA as regional planning authorities. The clarification of governance structures, responsibilities and duties is the key to identifying doable adaptation measures.

5. Capacity Building

The implementation of the planning tool CATHY and more so its continued actualization assuring applicability, usefulness and utilization after the project finish in 2013 will highly depend on capacity building measures with potential users and, later on, also on capacity building processes within the user organizations itself. The latter will exceed workshops and training courses and include training-on-the-job, learning-by-doing etc. Besides the work with CATHY, workshops with stakeholders on climate impact paths and their quantification will also help to sensitize them to climate change aspects and to initiate a discourse on climate change in the wider political arena. Already the two workshops with TERI during the first project phase contributed to a sensitization to climate change impact particularities in Hyderabad within the scientific community. All this entails capacity building.

WP 2.1 – Lifestyle Dynamics and Climate Change

1. Scientific Stringency

A key activity for safeguarding the scientific stringency of the project was to strengthen the focus on climate change. Both the stakeholder analysis and the discourse analysis of WP 2.1 served this purpose by revealing the social and communicative contexts by which climate change in India and Hyderabad in particular is perceived and dealt with politically. The contacts with national and local stakeholders have been intensified and stabilized during visits to India in September 2008, January, and February/March 2009. From a scientific point of view, the establishment of cooperation with TERI as well as local universities in Hyderabad has been a major success factor, and it will contribute to the climate-based integration of the project. During the reporting period, the project has initiated a scenario process which helps to mainstream project activities both internally and with respect to our stakeholders. Together with RESS, PIK has started to check the feasibility of a solar power plant in the region. The analysis of local emissions has also begun, but has to be prolonged due to data availability problems. In close cooperation with WP 3.2.A, we will finalise this analysis by July 30th, 2009.

A representative household survey is being prepared and profits from TERI's experiences in other Indian cities. Together with RESS, PIK plans a modeling workshop on 'Low Emission Scenarios for India' later in 2009. We will continue the scenario building process and want to intensify the stakeholder involvement. In order to improve the climate mainstreaming, we are planning together with the Energy Conservation Mission (ECM) a certified professional education module for administrative staff on energy efficiency and emissions reduction. Coordinated by RESS, PIK will contribute to the feasibility study of the solar power plant.

In order to improve the governance orientation of the WP, we have started to analyse the institutional contexts of our stakeholders. As part of the scenario building process, we started to specify the theoretical concepts of governance for our local situation, and under the conditions of energy and climate change. For the next reporting period we want to explore the conceptual and empirical relations between lifestyle and governance more thoroughly. Special attention will be paid to the role of the middle classes.

The goal of complexity reduction was achieved by basically two measures: First, we used the scenario building process to concentrate on the main issues of the local society-climate nexus. Second, we identified the major GHG emission paths of the city, driven by lifestyle and consumption patterns, in the domains of energy use, food/health, and mobility/transportation. In a next step, it is planned to attribute empirical numbers to these paths, and to characterise them by type and strength of their malleability.

Together with WP 1 it has been qualitatively analysed what emission effects different impact paths could have, an analysis that we want to quantify in the near future. These impact paths have also been used in order to identify vulnerable social groups in a preliminary assessment and will serve as a basis for our representative household survey.

2 Applied practice orientation and transferability

In view of the planned pilot projects, we identified possible activities together with stakeholders in Hyderabad. They will be analysed according to their effectiveness in climate terms as well as to their feasibility. A quantitative assessment of their reduction potential is about to follow. Both the planned emission analysis and the scenario process provide the opportunity to compare with other cases and to transfer results. The pilot projects will be screened for transferability by separate checks. The vulnerability assessment based on our household survey will be fed in the local decision making process.

3. Involvement of local actors

As a result of our three stays in India, contacts with, and involvement of, local stakeholders have

been improved substantially. This also holds for the relatively powerless group of the urban poor, which we will pay special attention to in the planned survey. Here, the cooperation with CHATRI (Campaign for Housing and Tenurial Rights) is a crucial success factor. Besides formal cooperation contracts (as with TERI), we also work with informal (e.g. verbal) commitment or with communication tools.

The scenario process which has been initiated during the reporting period proved to be a fruitful tool for stakeholder involvement as well. We have asked stakeholders about their views of Hyderabad's energy and climate future, and we use their input for scenario modification. PIK contributed to the preparation of a participatory exhibition in a Hyderabad quarter, organised by WP 6.

The household survey as well as the pilot projects will be realized in close cooperation with local stakeholders and research institutions. The stakeholder analysis, completed during this reporting period, helps in identifying possible overlaps with their own agendas and resources/weaknesses. We are trying to increase the incentive of stakeholders to cooperate by checking for co-benefits of climate policies and overlaps between climate and sustainability goals. Primary local stakeholders comprise the Forum for a Better Hyderabad (FBH), the Right to Walk Foundation (R2W), the Energy Conservation Mission (ECM), and Tarnaka Residents Welfare Association.

4. Involvement of relevant institutions

In parallel with the stakeholder analysis, we contacted many local and regional (state of Andhra Pradesh) institutions. Their internal agendas as well as their resource and power base have been analysed, and we tried to identify possible points of cooperation and intervention.

For WP 2.1, the Implementation Body of GHMC is a key local institution. HUDA's Planning Body has already indicated mutual interest. We will utilize our contacts with the mass media (press, TV) in order to facilitate network building between organisations and institutions.

5. Capacity building

As occasional workshops may be helpful, but certainly do not suffice to create enduring capacity, we see two major roads for capacity building: mutual interest, and network building. By trying to spell out the benefits and co-benefits of climate policies, we are trying to raise the interest of local stakeholders, and by involving them in the research process (which includes information sharing, but is not restricted to it), we seek to improve their understanding and, if possible, framing of climate change. Our stakeholder analysis revealed that a widely untapped resource of Hyderabad is the lack of networking between different groups of stakeholders. We try to build capacity by facilitating network building. In general, we follow the *Crafting Rules by Discourse* (CRD) approach (cf. section 2.3.1 of the report by the Overall Coordination of the project).

During the reporting period these activities have been started, e.g. during workshops and interviews. Our scenario workshop has been an important first step, which we want to continue. Together with the Energy Conservation Mission (ECM) we plan certified interagency round-tables with administrative staff on energy conservation and emissions reduction. Scientific organizations at the national and local levels will help us to realize a sustained impact of the project.

Institute for Cultural Geography, University of Freiburg (CULT-Geo)

WP 2.2: Food, Nutrition and Public Health

WP 4.2: Health Systems

1. Scientific stringency

Complexity reduction and project reformulation with the focus on energy and climate; the subproject (WP 2.2. and WP 4.2.) has been reduced in its complexity to the effect that climate

and energy relevant questions in the fields of food provision, nutrition and health were explicitly brought into scientific focus. In the field of health, the application-oriented analysis of sanitary-hygienic induced health risks in relation to drinking water is the main study objective. Altogether, the project aims for an application-oriented generation of knowledge regarding energy efficient and climate neutral nutrition provision and food security in Hyderabad. Based on empirical research, the intensive literature study, and, in close cooperation with WPs 4, 7 (IfG) and WP 2.1 (PIK), fundamental structures, stakeholders, actors and driving forces of the dynamic transformation in the local/regional food system will be revealed. In addition, the *potential for change* regarding institutional innovations and governance reforms will be identified. Furthermore, the project deals with the compilation and the conceptual strengthening of local/regional *adaptation potentials* facing climate relevant and globalisation induced risks of the food system (adaptation) as well as the promotion of institutional innovations, which contribute to the *mitigation* of climate change. Basically, the sub-project deals with the promotion of regional/local systems of food production, food provision and food procurement as well as consumption and lifestyles, which should be eco-friendly, of low-emission and socially sustainable.

The objectives of the sub-project can be summarized as follows: Improvement of the urban food procurement security, of food safety and nutritional condition without a vital enlargement of the food carbon foot print; promotion of (1) low-carbon food provision, (2) low-carbon and healthy diet patterns.

In accord with the political decentralisation-initiatives of the Indian Government and the objectives of the JNNUR mission, the subproject explicitly pursues a bottom-up approach. With the involvement of local stakeholders and actors (NGOs, Resident Welfare Associations, Merchants and Hawkers Associations, government officials), and using participatory tools, the specific problems and felt needs in the fields of food, nutrition and health have already been identified in workshops and group discussions and further analysed by means of scientific background studies. The results will be re-introduced into the discussion circle in the coming phase. Climate neutral and energy efficient problem solving strategies will be developed, together with the search for a possible implementation of permanent pilot projects.

2 Applied practice orientation and transferability

Following a stage of in-depth knowledge generation, awareness raising and capacity building, and due to extensive single and group interviews as well as the results of a preliminary networking workshop (February of 2009) in which delegates of the GHMC, NGOs and representatives of the street vendors' interests participated, a good basis has been established for the envisaged implementation of a 'Sustainable Street Food Plan' as a crucial element of a local, resource conserving and socially sustainable urban food system. Regarding the conceptual framework and the organisation of empirical research work, this is done in close cooperation with the Institute for Cooperative Studies (IfG), whose Work Packages concentrate on the promotion of the cooperative movement in the urban small retail sector. WP 2.2 provided important preparatory work by means of a background study.

Transferability of the 'Sustainable Street Food Plan' to other Indian Megacities is intended. For this purpose, first dialogues were conducted with representatives of the National Alliance of Street Vendors of India (NASVI) and with trade unions from Mumbai and Kanpur. Their experiences from the establishment and strengthening of a decentralised mobile urban food provision system are to be taken up and adjusted to the specific situation in Hyderabad.

3. Involvement of relevant actors

As the involvement of relevant actors in the work packages discussed here is closely interwoven with the integration of relevant organizations, it will be included in the following section.

4. Involvement of relevant institutions

By May 2009, all relevant institutions and actor groups have been identified and adequately engaged in the project planning as well as in decision making processes:

- The domain of the mobile petty trade is constituted by hawker unions which differ in terms of religion/confession or their linkages to political parties, representatives of the Greater Hyderabad Municipal Councils (Health and Transport Departments, Govt. of Andhra Pradesh), as well as of the governing body of Indian street traders (NASVI).
- In the field of the urban food production (topic: NPM – non pesticidal management food - and organically cultivated foods), relevant institutions and actors are the Centre for Sustainable Agriculture (CSA), Deccan Development Society (DDS), Hyderabad Agriculture Cooperative Association (HACA); further the Department of Consumer Affairs Food & Civil Supplies, Govt. of Andhra Pradesh, as well as the representation of small farmers in Hyderabad's periurban areas.
- The field nutrition and health includes the National Institute of Nutrition, Hyderabad; the Indian Institute of Health & Family Welfare, Hyderabad; the Kasturba Gandhi Degree and P.G. College for Women - Department of Nutrition as well as the diet consultancy Nutrifit Dieticians & Nutritionists, Hyderabad. With the Institute of Public Health, Hyderabad, a close co-operation in the field of Environmental Health Risks and Climate Change is intended. Detailed consultations and arrangements will be conducted in September 2009.

One crucial result of the first street vendors' workshop in February 2009 was an agreement on regular consultations between the municipality and street vendors which will serve to clear up the most urgent problem and conflict areas. The first meeting in May 2009 will be dedicated to irregularities in the allocation of trading licences.

5. Capacity building

So far, the relevant target groups, their problem situations, needs and interests were identified through focused group interviews with street vendors (male and female); interviews with NGO-representatives and hawker unions and interviews with officials (GHMC Medical Dept., Transport Dept.). Provisions achieved are the organisation of the first Street Vendors Day in Hyderabad, on January 25th, 2009; networking and awareness raising workshop on Street Vendors for a better Hyderabad, February 25th and 26th, 2009 in cooperation with Sannihita, Ektha, Bhagyanagar Hawkers Union, NASVI – National Alliance of Street Vendors of India. The first representation of interests for female street vendors in Hyderabad was founded in March 2009, resulting from the street vendors workshop.

Next steps completed *until the 2010 milestone* will be:

- Preparation of the first Street Food Festival in Hyderabad with the purpose of (1) a further sensitisation of the public, (2) a tightened networking of merchant unions and NGOs, and (3) a better integration of official stakeholders (Autumn-Winter 2009/10).
- Preparation of the second workshop on mobile street trading with the aim of a further networking of local actor groups, the probing of possibilities for the creation of direct marketing chains for NPM and organic food; discussion of study results (Spring-Summer 2010).
- Extension and improvement of the self-organisation of small mobile retail dealers, especially with female traders (introduction of a savings- and micro credit system).
- Campaign for proper hygienic aliments in street food sale and training on the job (Campaign on Street Food Safety) (Autumn-Winter 2010/11).
- Shooting of a documentary of 45 minutes on the living conditions and the problem situation of small mobile retail dealers in the globalising food system of Hyderabad (in cooperation with Christ Media; available online at www.christmedia.de/; sponsored by the German television stations ZDF, respectively ARTE) (Autumn-Winter 2009/10).
- First workshop on Environmental Health Risks (Spring-Summer 2010).

- Preparation of further background studies on Street Food Safety, Nutrition-related Disease Patterns, Environmental Health Risks, and Food-Carbon Footprint.

In the subject area of *impact paths*, it was set out to record the specific food-carbon footprints of various social and income groups. The food-carbon footprint provides details of the amount of emissions regarding specific food consumption patterns. Additional systematic recording of the food-carbon footprints in the form of our Background Studies, which should reveal important basics for the compilation of a complete impact scenario, is planned until Autumn 2010.

So far, seven background studies have been completed for the subproject. They provide fundamental information on the central elements of Hyderabad's rapidly changing food system, which up to now has not yet been comprehensively studied in a scientific way. The studies cover the political-institutional domain (study 1), the area of periurban food production (study 3) and food allocation (studies 2, 3, 4) as well as food consumption and diet-related issues (studies 5, 6, 7). All background studies include explicit references to the topics of climate change and energy efficiency. Background studies prepared *until May 2009*:

1. The challenge of organizing Hyderabad's highly dynamic food system under conditions of global change – an analysis on relevant stakeholders, networks, power and knowledge relationships (*authors: Ms. Sujata Surepally, Sannihita & Ms. Sarah Nischalke, CultGeo*)
2. The changing food-retail scene in Hyderabad (*author: Ms. Anika Johnsdorf, CultGeo*)
3. The market for organic food in Hyderabad – an assessment of consumer attitudes and marketing opportunities (*author: Ms. Nina Osswald, CultGeo*)
4. Women street vendors in the food system of the emerging megacity Hyderabad – opportunities and constraints (*author: Ms. Usha Rani, Sannihita*)
5. Changing food culture in globalizing Hyderabad (*author: Ms. Rebecca Hofmann, CultGeo*)
6. Food consumption and nutritional status in Hyderabad – an empirical study on the poor and middle income classes (*author: Ms. Dr. Radha Reddy, Sannihita*)
7. Urban food security at risk: Empirical survey among the poor and lower middle classes in the emerging megacity Hyderabad (*author: Mr. Gernot Kist, CultGeo*)

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WP 3.2.A Energy Management for the Emerging Megacity of Hyderabad

1. Scientific stringency

Work Package 3.2.A analyses energy management systems and calculates climate and efficiency impacts of sustainable energy management. The analysis distinguishes energetic efficiency and economic efficiency for considering differences in emissions, for example between fossil and renewable energy sources. Additionally, this allows for calculating cost differences between different policy measures in the energy sector.

The Work Package delivers a "Background Study" and a "Stakeholder Analysis" by the first *Milestone in May 2009* and discusses climate and energy issues. The Background Study outlines the structure of the Andhra Pradesh energy sector and reflects sector-specific governance-structures in terms of regulatory framework of different policy levels and applied instruments of market regulation. Since the Work Package has started its activities in January 2009, relevant stakeholders were identified and contacted in order to reveal the deficits and problems in the energy sector in Andhra Pradesh, particularly in Hyderabad. These communication and information processes will be extended during the Stakeholder Analysis until the first Milestone in May in 2009. In the Stakeholder Analysis we investigate capacities, incentive structures, influence in society and politics and the networks of stakeholders. This provides us with information about the room of maneuver that the stakeholders can use for reducing inefficiencies in the energy sector, which have been identified through the Background Study.

A survey on consumer behaviour regarding power and heat consumption will be conducted in the second part of the Background Study to be finalized until the next Milestone in May 2010. We use standard research methods for analysing consumer behaviour and also own approaches to consumer behaviour and its impact on their willingness to pay for efficiency improvements within the energy sectors (Rommel, K. & Meyerhoff, J., 2009: Empirische Analyse des Wechselverhaltens von Stromkunden. Was hält Stromkunden davon ab, zu Ökostromanbietern zu wechseln? Journal for Environmental Economics 33 (1): 74-82.; Rommel, K. & Meyerhoff, J., 2007: Are Cost Based Green Power Promotion Schemes Efficient? A Comparison of Feed-in Tariffs and Consumer Preferences. In: Fichert, F., Haucap, J. & Rommel, K. (eds.): Competition Policy in Network Industries, LIT, Vol. 3, Berlin, 179-202). Both Background Study and Stakeholder Analysis will be used for describing the reference scenario which enables us to investigate technical, economic and institutional measures for improving the efficiency of the energy sector in Andhra Pradesh and Hyderabad. The reference scenario will provide basic elements for continuing the scenario analysis by employing an energy accounting model to be designed in co-operation with TERI (Deambi, S., ed., 2008: From Sunlight to Electricity. A practical handbook on solar photovoltaic applications, Revised Edition, TERI Press, New Delhi). Efficiency criteria will be established to identify standards for energy management, regulation and technology that serve to investigate the costs and institutional feasibility of energy saving measures.

Until the second Milestone in May 2010 we will concentrate on energy and climate by calculating efficiency gains that arise from changes in the power generation mix, improvements of transmission and distribution grids and market regulation schemes. The regulatory structures of the energy market represent an essential element of the governance concept which will be applied to identify drivers of and obstacles to energy savings and efficient technologies. The governance concept reflects the structure of the energy sector in detail and then quantifies effects of regulatory instruments on energy efficiency. The results will reveal potential energy savings in terms of reduced consumption of heat and power. Moreover, the conclusions which can be drawn from the calculations also refer to the implementation of institutions and instruments which enable capturing the efficiency gains and overcoming obstacles that act against the application of adequate technical measures.

By finding the reasons for inefficient energy use and identifying drivers for and obstacles to improvements in all areas of the energy sector, impact paths leading from the status quo to more efficient energy supply can be pointed out (Shukla, P. R., Dhar, S., Mahapatra, D., (2008): Low-carbon society scenarios for India. Climate Policy 8, pp. 156 – 176). In this process, we intend to reveal technological constraints and design institutional change required for establishing sustainable and energy efficient standards. For developing the reference scenario in a consistent way, the results from both the Background Study and the Stakeholder Analysis are jointly taken into account. The Background Study identifies improvements of efficiency in the energy sector such as reduction of transmission and distribution losses and then calculates marginal mitigation costs.

The stakeholder analysis provides data for calculating transaction costs of institutional change which accrue to the stakeholders and represents a basis for modeling efficiency optimization starting *after* the second Milestone in May 2010. Model results will indicate what changes in governance structures are required. The modeling and calculation methodology will be applied to similar research questions in other Work Packages to reduce complexity and to calculate effects on climate and efficiency regarding food, nutrition, health, water, transport, co-operation and selected industries.

2. Practice orientation and transferability

Demonstration projects developed in the WP aim at reducing the deficits identified in the reference scenario and calculated by the efficiency optimization module. The role of drivers of

and obstacles to potential energy savings and their effects regarding efficiency gains to be shown by demonstration projects are in the centre of interest. Drivers of efficiency are, for example, private and commercial consumers who are interested in closing the gap of energy supply by local power generation and micro-grids such as solar thermic plants, photovoltaic, and biomass from organic waste. Obstacles to an increase in efficient energy use are, for example, subsidies for irrigation in the agricultural sector. Approx. 70 % of the entire power consumption in Andhra Pradesh is used for this purpose. These subsidies distort incentives for efficient use of power. Efficiency gains from energy savings and the use of renewable energy can only be achieved by giving adequate price signals to the recipients of subsidies. A change in subsidy policies seems to be hardly enforceable because of countervailing political influence of the agricultural sector. Demonstration projects will focus on this problem and develop concepts for replacing energy consumption subsidies by energy generation subsidies for farmers that support local power generation such as photovoltaic and small biomass plants. Regulation of these subsidies by offering a quantity cap and feed-in options will provide incentives for efficient power use to farmers. Fields of application to be shown in demonstration projects will be identified and elaborated until the first Milestone in May 2010. The final results of the Background Study and the Stakeholder Analysis will be used for calculating transaction costs and net benefits and for organising Pilot Projects together with the stakeholders until the second Milestone in May 2010.

3. Involvement of local actors

Since a few years an enormous electricity supply gap exists in Hyderabad and Andhra Pradesh. It increases steadily, although several measures to increase supply have been taken. Hence, for reducing demand, applicable methods and Pilot Projects are urgently needed to find and test effective measures to increase energy efficiency. Involvement of local actors will be facilitated by the Stakeholder Analysis of this WP and the Stakeholder-Matrix of the overall project (to be handed out on demand). The pilot projects first require methods to find criteria for the designing the projects together with stakeholders and for interconnecting with relevant pilot projects. Secondly, impact paths of the pilot projects will be calculated, and resulting allocation effects will be indicated. In addition, the integration of local and regional actors will be supported by the cross-cutting function of WP 3.2 A in calculating efficiency effects that result from activities which belong to other WPs.

The relevant actors from the energy sector will be classified into primary, secondary and other stakeholders (see Stakeholder and Partner Map in WP 3.2 A Figure 4, Annex 2). Primary stakeholders, such as the municipal administration HMDA (Hyderabad Metropolitan Development Authority under direction of Dr. J. Reddy), and the NGO “Energy Conservation Mission” are directly involved in the development and implementation of Pilot Projects due to their own interests, competences and capacities. Secondary stakeholders such as the regional energy utilities and grid operators are involved because of the jurisdiction under which the Pilot Projects will be implemented. The involvement of stakeholders from the energy sector is put into practice so far by thematic surveys, involvement in workshops and other activities.

These integrative activities will be kept up and reinforced, especially for the development of Pilot Projects, and intensified by the involvement of stakeholders in all planning and implementation processes. Existing examples for this are the early integration of the “Energy Conservation Mission” in surveys and workshops and also the current cooperation with numerous actors to develop Case Studies and Pilot Projects. After the Background Study and the Stakeholder Analysis have been completed, a monitoring procedure will be developed and applied together with the project coordinators to ensure well-balanced and fair involvement of the stakeholders.

4. Involvement of relevant Institutions

Similar to the integration of relevant stakeholders all relevant organizations have been identified and included while preparing the Deliverables for the 1st Milestone. This mainly applies to TERI which is endowed with a budget of 200.000 € for Capacity Building measures for the whole

project duration and which works together with WP 3.2 A. Furthermore, the Chair of Professor Geetha Reddy Anant at the Centre for Indian Ocean Studies of Osmania University Hyderabad will contribute to the energy analyses and to the design of Pilot Projects.

5. Capacity Building

During the Background Study and the Stakeholder Analysis the target groups for Capacity Building measures will be identified. Their interests and needs will be explored by quantitative surveys and qualitative expert interviews. Implementation of innovative technologies by households and companies requires the development of *didactic concepts* to be employed in training the users as regards to the application of technologies, expected efficiency gains, amortization periods, local utility, security aspects, etc.

The analysis of the information and data on the demand and the preferences of target groups will be based on descriptive statistics. Besides identifying actors' preferences, this allows for measuring the attitudes and behavior of actors. The results will be taken into account when developing the Capacity Building measures. Workshops and training programmes will integrate with existing qualification modules of the participating stakeholders, such as schooling and measures to create consciousness for energy efficiency measures within the frame of the "Energy Efficiency & Conservation Cell" (EECO) of AP TRANSCO. The instruments of Capacity Building will include participative elements, such as group discussions and thematic excursions to offer an enabling learning environment for *organizational learning* within the existing organizational structure of each stakeholder. Constitutive platforms are the currently developed Pilot Projects, through which the involved stakeholders can develop competences for all steps required for making an innovation work.

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WP 3.2.B: – Traffic Planning

1. Scientific Stringency

WP 3.2.B provides planning principles and tools for developing a transport system that is energy efficient, meets climate policy objectives and is sustainable in terms of the future needs of the residents. It also elaborates first recommendations for an innovation strategy. Accordingly, this WP focuses on a climate-friendly design of the transport sector, which is one major emitter of greenhouse gases due to the use of fossil fuels (ca. 30%). Therefore it is of high relevance for the overall goals of the Hyderabad project. In the Pilot Projects, only measures which have a high potential to increase the energy efficiency of the transport system are taken into account. WP 3.2 contributes to the reduction of complexity by participating in the scenario process.

2. Practice orientation and transferability

PTV is interested in developing products that can be further used in other regions/cities, for example. This applies to the two main components which represent the research activities of PTV: a city-wide Strategic Planning Tool and Pilot Projects.

The original work plan of the PTV subproject has put a strong focus on the development of a Strategic Planning Tool in the first year (3.2.B/ Task 1-4). As the application of the tool by the authorities in Hyderabad would only take place after the tool had been completed, involvement of relevant stakeholders at the beginning of the work was required only to a very limited extent. In contrast, the application-oriented Pilot Project "small-scale- traffic management scheme at neighbourhood level" (WP 3.2.B Task 8) - which was scheduled from year two of the project - involves various groups (local actors, NGO's, public authorities) right from the beginning. Hence, the meanwhile initiated activities are already coordinated with the Additional Commissioner Traffic & Transport from GHMC and various NGO-representatives (Foundation for the Right to Walk, Forum for a Better Hyderabad etc.).

As a response to the reviewers' suggestion to start application activities and stakeholder integration earlier, we rearranged the schedule and tackled this task right away. It comprises two Pilot Projects that differ in their kind of measures, the surrounding local population and economic structures and the applied participatory techniques. This approach of applied and stepwise analysis, which includes an investigation of implementation barriers, can easily be transferred to other parts of Hyderabad as well as other cities. Deliverable 2009/PTV/Nr.11 gives details on the Pilot Projects. Provided that PTV succeeds in achieving the research objective to adopt state-of-the-art-planning tools to the Indian conditions and to the particularities of fast growing cities, as well as to the specific requirements of Indian planning processes, there will be a very high potential to transfer the instrument to other Indian cities and other Megacities, too.

3. Involvement of local actors

Already in the preparatory phase of the project a multitude of contacts to local actors has been established, and their demands were taken into account when conceptualizing the main project phase. These contacts have been deepened during the latest Pilot Project activities. This will be continued, intensified and broadened by planning workshops, interviews, narratives, etc. Related to the city-wide planning process, consultation mechanisms will be developed to ensure the participation of citizens at large-scale traffic measures and infrastructure projects.

4. Involvement of relevant institutions

For efficient coordination and implementation of town-wide traffic, transport planning and major infrastructure projects, a Unified Metropolitan Transport Authority (UMTA) has been established in December 2008. UMTA is headed by the Chief Minister of Andhra Pradesh and staffed by the heads of all public authorities that are involved in transport planning, service provision etc. (e.g., Traffic Police, Pollution Control Board, APSRTC, Metro Office, GHMC, HMDA). Henceforth, major traffic projects will not be coordinated anymore by only one authority alone, as has been the case in the past, but by UMTA. This also affects the clearance for the planned comprehensive traffic surveys and the Strategic Planning Tool of PTV/ESCI.

At present, UMTA is involved indirectly in the scenario process by single heads of institutions (e.g. HMDA, GHMC). However, for one of the next UMTA sessions, PTVs research partner ESCI has been invited by Dr. Jawahar Reddy (Vice-President HMDA) to present the project activities (esp. the Strategic Planning Tool). After that, regular cooperation shall be established to secure the support for the fundamental research work concerning the tool for medium to long-term planning of an energy efficient transport system in Hyderabad. Furthermore, UMTA is the appropriate body to develop improved/innovative governance-structures for the transport sector. Questions like: how to organise a "cross-authority-transport-planning process", and to which authority shall the planning tool be allocated, or how to incorporate public concerns into the planning process have to be addressed.

Traffic Police and *Planning Cells of the Municipality (GHMC)* are primary stakeholders for the implementation of local, small-scale measures and Pilot Projects. Traffic Police is in charge of traffic regulation, control of crossings and signalised and non-signalised intersections, and road safety education. The *Planning Cells of the Department of Town Planning and Traffic Planning* are responsible for the provisioning and maintenance of local roads including footpaths and cycling facilities. At present, footpaths or cycling facilities "tend to get forgotten" most of the time when road widening, due to increased traffic volumes, takes place. The authorities mentioned above will be constantly involved in the conceptualisation and implementation of the Pilot Projects.

5. Capacity Building

Up to May 31, 2009, PTV carried out a series of capacities building measures for different target groups. These will be continued and extended to additional target groups:

- Since February 2009, PTV has a *teaching assignment* at JNTU School for Urban Planners and Architects wherein students of the field “Urban Planning” are taught the *principles of sustainable, energy efficient transport planning*. This assignment will be enlarged the coming semester. Additionally, courses for students of the engineering faculty at JNTU and seminars for professional transport planners of Indian public agencies at ESCI, which is a training Institute for senior engineers and managers, are planned.
- In the course of activities/events of local NGO’s, PTV contributed professional input in terms of best practices in sustainable transport planning. During the “Walk-to-School-Day” organised by the Right-to-Walk-Foundation, for example, PTV demonstrated how to improve the situation of pedestrians. PTV also was showing a German example of a Citizen Charta at a workshop (Citizen Charta for a better Transport in Hyderabad) organized by a number of NGO’s.

Beside these activities, the main contribution to Capacity Building is the *training-on-the-job* of the Indian research partner ESCI and of the qualified administrative personnel of the institution that will be in charge for the application and up-dating of the Strategic Planning Tool. The division of labour between PTV and ESCI is as follows: ESCI has the lead for the development of the Strategic Planning Tool, with qualified support from PTV. PTV will be the lead partner for those tasks which require vast experience and when it comes to the adoption/adaptation of the model software. The administrative personnel will be integrated into the working process at an early stage and intensely trained in all relevant aspects of the planning process and tool application.

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WP 3.2.C: Food-Water-Environment-Nexus

1. Scientific consistency

The overlapping perspective of resources within the “Food-Water-Energy-Environment Nexus” represents an eminent energy and climate focus as it puts the linkages of each Work Package into the center of analysis through their impact on climate change. During the Scenario Workshop in March 2009 in Hyderabad, the involved dimensions – water and energy – have been incorporated into two scenarios and conceptualized regarding their impact on a “Worst Case” and a “Sustainability Scenario”. Within the upcoming project phase, the energy and climate focus of this subarea will be evaluated by quantifying their impacts by means of data analyses and expert interviews and embedded into the scenario process. Differentiating between the adaptation and mitigation potentials of each cross-cutting dimension of this nexus increases the climate-policy focus of each dimension and contributes to the reduction of complexity of each linkage.

The governance concepts of this WP are structured within three subareas: basics, structures and processes of governance activities. The basics of the governance level in Hyderabad have so far been structured through the analysis of legislation, acts, orders and regulations at national and state levels within the infrastructural linkage of the water, energy and environment sector. For the upcoming project phase an analysis of contract bases and their enforceability is planned to develop concepts for the adaptation or modification of the institutional framework. Concerning the governance structures, the hierarchies within the water sector and the linkages with energy and food have been analyzed and evaluated within the Stakeholder Analysis (1st Milestone). The existing participation of the private sector and possible fields for participation will be analyzed to connect the public and the private sector with market mechanisms. The governance procedures have so far been analyzed as regards their planning elements and modalities at the administrative level. The findings will be evaluated regarding their compatibility with participative elements within planning, implementation and evaluation.

The concept of this thematic field of WP 3.2 C is designed to reduce the *complexity of the impact paths* to enable a better quantification. The analysis of the impact paths as well as the calculation of effects of each dimension of the water sector and their impacts on climate change contributes to this reduction of complexity. An integration of the most important linkages increases synergies and reduces trade-offs and doubled efforts.

2. Application orientation and transferability

In the interface area of water and energy/ climate change, the Krishna Water Supply Project plays a key role for which reasons it has been selected as the subject of a case study: This project supplies the urban areas of Hyderabad with an laborious and energy intensive pumping pipeline with drinking water. For this project the energy balance and GHG emission values will be calculated and compared with conventional methods of water resource management. In order to analyze rural urban linkages within the Water-Food Nexus, an overview of the impact pathways of rural watershed management programmes on Hyderabad will be given. The necessary data is accessible with the Watershed Management Organization WASSAN.

The implementation of Pilot Projects in the water sector is divided into an institutional and a community level. At the institutional level, Capacity Building measures are being currently planned for energy efficient water supply. In the coming year, a test phase is planned in cooperation with the municipal water authority, HMWSSB, to evaluate the coverage of various Capacity Building activities. Results of this test phase will be part of the second Milestone Report in 2010, and serve as the basis for the implementation of Capacity Building measures at the administrative level in the coming project years. This implementation process will be evaluated with the help of the developed monitoring system.

Evaluation of further Pilot Projects for technology transfer in the water sector is currently in the conceptual phase (in cooperation with "Engineers without Borders", a working and student group in Hyderabad). In the coming months, current projects in the field of wastewater treatment, micro filtration and water supply in slum areas will be evaluated in terms of their potential for further upscaling. Subsequently, based on the feasibility of the projects, it is planned to further develop and then implement them together with the water authority. This approach secures the participation of the administrative levels, NGOs and student actors and strengthens domestic ownership.

3. Involvement of local actors

The management measures for Capacity Building within the project extend equally to the public , private and non-profit sectors. In the present course of the project, all relevant stakeholders in the energy-water interface from the public and nonprofit sectors have been identified and interviewed for their willingness to participate. Private actors already involved in project activities have also been identified and included in the Stakeholder Analysis. Further private enterprises will be included in the preparation and implementation of Pilot Projects.

The inclusion of urban poverty is important in the water sector. Current programmes of HMWSSB aim at the quality of water in order to minimize health risks. In the next phase of the project, a special focus will be on the urban poor while analyzing the involvement of the private sector in water supply issues. The participation of the private sector in infrastructure projects runs the risk that poor people will not be taken into account. Therefore, hybrid infrastructure concepts will be examined, which are sufficient, safe and provide energy efficient water supply and also ensure social acceptability criteria. The participation of the private sector will be regulated by administrative contracts. Management of these contracts and regulation of water provision still remains a task of the administrative authorities.

The speed of population growth of Hyderabad is exceeding the capacity of the infrastructure development of the water sector. Especially during summer months, the demand for water is much higher than the water supply. The Municipal Water Authority responded to this problem with limited daily water supply and, for reasons of necessity, provides only short term solutions.

For example they introduced a GPS-based system of tracking the water tank trucks in order to guarantee uniform water coverage of all urban areas. Due to tremendous water shortages in the last five years the above mentioned Krishna Water Project was established, which transports water over a distance of 115 km and from an elevation of 40 m to Hyderabad. The evaluation of the energy and GHG balance of this project is still pending.

The stakeholders of the water sector represent different needs and requirements. The Irrigation Department is planning a long-term water supply strategy for the equitable meeting of urban and rural water demand. The Forest Department in turn has initiated a climate and environment cell, which aims to develop a climate-friendly strategy for the city in cooperation with local private and NGO actors. Concrete ideas about long-term solution strategies do exist, but the present situation is so bad that there are no capacities for long-term solutions.

In order to anchor and increase domestic ownership, a demand-driven approach for the implementation of measures of the stakeholders will be developed. On the one hand, this will be based on consumer studies in the water sector from all social levels of the city as well as on experience from the successful implementation of a "Water Safety Plan" of the World Health Organization in collaboration with the local authorities. Through a mechanism of announcement of tendering knowledge concepts, the individual cities had to apply for the programme which in return achieved a high degree of cooperation and ownership. This approach will be developed and implemented on a "small-scale" basis to ensure ownership by the stakeholders and to meet their demands.

4. Involvement of relevant institutions

As part of the stakeholder analysis, the project-related governance structures in the water sector have been collected and analyzed. An analysis of power relations and decision-making took place, which is crucial to the implementation success of this project. An analytical breakdown of institutions into the areas of basic units of governance, governance structures and governance processes has taken place. From this categorization can be derived mechanisms for the involvement of institutions into the project plan.

5. Capacity Building

Capacity building measures require agile organizations to secure their success and to ensure the implementation of Pilot Projects. First, it is planned to raise awareness on the duties of the stakeholders at the institutional level. The definition and delimitation of competences is the basis for the implementation of Capacity Building measures on governance, regulatory and implementation level. The measures are related to integrative water management and energy efficiency in the water sector.

Awareness rising of the importance of climate change within the water sector is the starting point of the measures, which are to be followed by concepts of organizational learning. Deepening the measurement can be done by "off-the-job" training through seminars, group work and case studies making comparisons with other cities in India. In the area of "on-the-job training" it is imaginable to conduct project collaboration. This has been the advantage of breaking up strong hierarchical structures and replacing them by networking at the institutional level. It also provides the involved employees with deeper insights into other areas of operation, and therefore contributes to awareness rising for interface problems. For this process a scientific advisory approach will be developed which includes practical implementation and participation of relevant stakeholders as well as a monitoring system, in order to evaluate the success of such a measure on the administrative level in developing countries in general.

In order to fulfill the cross-cutting function of this Work Package, close cooperation with stakeholders is necessary and networking with the quantitative work of PIK is planned. Quantification of the above mentioned impacts on GHG-emissions in this area will be included, supplemented with more detailed content analysis and effects of single chain dimensions.

WP 6 - Participation and Communication Strategies

1. Scientific Stringency

Participative und communicative approaches are essential for creating and increasing awareness of the consequences of climate change and mitigation- and adaptation strategies among affected stakeholders while integrating the local knowledge and the needs of the affected groups and activating them to take self-initiative. Discussion about the reasons for and consequences of climate change is only marginally reaching large segments of the population. Therefore, close co-operation between stakeholders from civil society, economy and science is needed to develop political strategies. The issue of “Climate Change and Energy Efficiency” requires new forms and means of communication and participation, mainly in the form of conducting intensive discussion on the reasons for and consequences of climate change that is not only oriented towards political solutions, but also includes possibilities for self-action in daily routines. Thus, communication and participation strategies have a major influence on saving greenhouse gas emissions and the adaptation to local consequences of climate change.

Therefore, WP 6 develops and implements innovative and activating tools for participation and communication. For the Milestone in May 2009 a Background Study on “Constraints and Opportunities for Communication and Participation in India” was prepared, exploring the kind of framework needed for a political dialogue on climate friendly, energy efficient city development. The analysis focuses mainly on chances for participation by civil society, its democratic legitimacy and the existing forms and experiences of such participation. Furthermore, it identifies relevant civil society organisations in Hyderabad, which are active in the field of climate protection, energy, sustainability, and environment, characterizing their goals, activities, strengths and weaknesses, networks and specific needs. On the basis of this analysis, multipliers within civil society that are relevant to the project’s areas of concern can be identified for participative processes with other WPs. Based on these findings and using an iterative process to test strategies, participation strategies can be adapted to the local, cultural and civil society context in Hyderabad.

2. Application orientation and transferability

For the implementation of methods and tools of communication, co-operation and participation, web-based and direct interactive forms of dialogue (online dialogue, citizens’ panels) as well as participatory methods like citizens’ exhibitions, citizens’ juries and citizens’ forums are focused upon. At the end of the project, WP6 will have gained substantial knowledge and experiences in the areas of designing and implementing participative strategies and methods regarding specific mitigation and adaptation strategies. Hence, a compilation of practically tested methods and tools for sustainable Megacity development will be made available as an online-tool and as a guideline, as well as being integrated into the project’s dissemination strategy. Through close co-operation with other Megacity projects as well as a culture- and context-sensitive design, the methods can be refined and be fruitful for other projects (in a different cultural, religious, civil society or structural contexts) and be transferred to other Megacities.

Some of the Pilot Projects have already been implemented before of the Milestone in May 2009. One of them was the citizens’ exhibition “Ready to Move”, the aim of which was to integrate citizens and relevant stakeholders into the development of a sustainable, energy efficient transport management system. For this, it was necessary to integrate the knowledge of citizens into the planning process, to analyse the citizens’ awareness of problems in the transport sector and to develop innovative solutions that would be supported by the local stakeholders. The citizens’ exhibition was organised in co-operation with the main stakeholder of NEXUS, the “Tarnaka Residents Welfare Association” (TRWA) in Tarnaka, a locality of Hyderabad city. As part of this

exercise, in co-operation with PTV and TRWA, citizens and representatives of the local administration in Tarnaka were interviewed to find out about the problems they face in transportation and their suggestions for possible solutions for a sustainable traffic and transportation system. Out of the interviewees' statements and their pictures, the citizens' exhibition was designed in two languages (Telugu and English) and inaugurated on March 1st, 2009 within the "5th Ward Sabha" (meeting) of the TRWA. A large number of residents of Tarnaka and Hyderabad and representatives from Osmania University, Hyderabad, and Bangalore were present. Until the middle of March 2009, the exhibition was on display in the community hall of TRWA and will now be shown in further public buildings (e. g. other community halls, Jawaharlal Nehru Technological University, Osmania University and the Goethe-Centre). The attention generated by the citizens' exhibition regarding the matter of sustainable traffic shall be utilised to develop new projects to reduce emissions in traffic *until the next Milestone in 2010*. As next steps, citizens' juries on the topic of "The Future of Public Transport" and projects to foster bicycle riding in Tarnaka are being discussed with the TRWA. The TRWA has taken a first step to foster bicycle riding by lending bicycles to senior citizens. This can well be used as a starting point for technical and organisational innovations to foster bicycle riding and to broaden the group of bicycle users.

Furthermore, the conference "*Hyderabad Citizens' Charter for Urban Transport*" was organised on 21st of February, 2009 in co-operation with the Goethe Centre Hyderabad, Right to Walk Foundation and PTV. Participants and speakers from civil society organisations, professional organisations, transport corporations, government offices and universities participated in the conference. Its aim was to bring together the most important stakeholders from different levels in the field of transport and traffic in order to discuss the different interests and possible conflicts. At the conference it was shown that the traffic problem is not perceived primarily as an environmental or energy problem, but rather as a safety (e.g. low safety for pedestrians, too many accidents) and time problem (traffic jams and long commuting times). This indicates that in order to raise awareness for climate related problems these aspects have to be used as starting points and then be linked to the necessity of energy efficiency and mitigation. Subsequent to the conference, a Citizens' Charter with the demands of the attendants was formulated and handed over to public authorities and political parties. The main demands and suggestions of citizens were, amongst others: The topics of traffic and transportation must get a higher priority on the agenda of political parties; the focus should be on transporting people not vehicles; prioritised lanes for buses; children should already be taught in school about traffic behaviour; the existing Multi-Modal-Transport-System (MMTS) should be strengthened; the timings of schools, offices and shops should be differentiated; during peak hours taxes should be collected from car users; the driving licence system should be improved; and formal training for auto rickshaw drivers should be introduced.

The interactive *online-dialogue "Ready to Move - Towards energy efficient and climate friendly traffic and transport solutions"*, a further participative communication tool to develop solutions for a climate friendly and energy efficient traffic system in Hyderabad, was developed and opened on the website of the project. It aims to activate as many citizens and actors from Hyderabad as possible to discuss about (1) their problems with the prevailing traffic conditions in Hyderabad, (2) their visions for a climate-friendly, energy efficient Hyderabad in the year 2020 and (3) feasible action strategies for a more sustainable traffic system with lower emission levels. These ideas and the knowledge gained shall be incorporated in future planning processes of the project. After the completion of the online-dialogue the findings will be evaluated and presented to the local actors in Hyderabad for further discussion, e.g. as part of a citizens' jury.

Until the Milestone in 2010, the participative and awareness raising processes for climate friendly traffic and transportation solutions will be continued (Pilot Projects in Tarnaka, citizens' juries on the future of public transport). Also, a Pilot Project that aims at encouraging renewable energy sources in agriculture in peri-urban Hyderabad is planned in co-operation with WP 3.2 (RESS). WP 6 will support this Pilot Project by integrating the local stakeholders (farmers,

CBOs, renewable energy enterprises) with participative and activating methods. Furthermore, to encourage low-emission lifestyles participative processes will be set in motion in co-operation with WP 2.1 (PIK).

3. Involvement of local actors

Involving local stakeholders in the activities of the project is a primary aim of WP6. In all its activities – whether in conducting the Background Study or implementing various Pilot Projects – WP6 works in close co-operation with local Indian stakeholders. WP6 has already gained valuable experiences in working together with different stakeholders like TRWA, Forum for a Better Hyderabad, Right to Walk Foundation, Centre for World Solidarity and Goethe Centre Hyderabad,.

The conference „Hyderabad Citizens Charter for Sustainable Urban Transport–was organised in close co-operation with the Goethe Centre and Right to Walk Foundation. Representatives of different levels shared the podium coming from civil society organisations (Forum for a Better Hyderabad, Citizens for Better Public Transport and Right to Walk Foundation), trade unions (Bus Drivers Union), transport corporations (MMTS, Andhra Pradesh State Road Transport Corporation (APSRTC)), city administration (Traffic Police, Public Works Department) and the JNTU. Representatives of various other administrative wings and civil society organisations as well as interested citizens were present as guests. The concept of the citizens' exhibition in Tarnaka was developed in close coordination with representatives of TRWA. Moreover, WP 6's existing contacts in Hyderabad are being used for the dissemination of the online-dialogue for a climate friendly and energy efficient traffic system in Hyderabad.

4. Involvement of relevant institutions

In the stakeholder analysis WP 6 identified important institutions and organisations of civil society and suggested concepts for their involvement. Several universities from Hyderabad are involved in the research process: Prof. Satyanarayana and Research Assistants (in the CSO analysis), Prof. Kumar, City and Regional Planning Department of the JNTU (presentation of the citizens' exhibition –Ready to Move ...?!“).

5. Capacity Building

Through the Pilot Projects, the participating civil society organisations, especially citizens and technical associations, are building sustainable capacities in the areas of citizens' participation, information and involvement. After a thorough examination of the requirements of individual partners in this direction in the preparatory phase (deepened during the Stakeholder Analysis), capacities will now be exercised in applied pilot projects which strengthen civil society. Through joint organisation and implementation of participative methods, the German and Indian partners will be involved in conscious *learning processes*.

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WP 7 – Cooperation, Participation and Gender Dimension of Sustainability

1. Scientific consistency

The Background Studies conducted in March and April 2009 and analyzed in April and May 2009 were devoted to two key research questions of WP 7: (1) In how far do traditional retail formats (Kiranas) contribute to the reduction of CO₂ emissions and the preservation of climate-friendly consumption patterns in Hyderabad and in what ways are the latter being put in question by today's globalization and modernization of retailing? (2) How do different electricity consumers today and in the future react to energy shortages and poor service delivery and what does this mean for energy efficiency? Both research questions shall be tested with regard to revealing what kind of possibilities can emerge from strategies of cooperation. The Background Studies will serve as a foil against which the development and discussion of alternatives for cooperative strategies can be analyzed.

In March 2009 the Berlin Institute for Cooperative Studies (IfG) together with the Osmania University of Hyderabad and the Roshan Vikas Foundation conducted the aforementioned Background Study and Stakeholder Analysis in the area of retail and Kirana Shops in Hyderabad. The Background Study is built upon the first results of CULT-GEO (WP 2.2) on the food supply sector and examined the situation of 85 Kirana shops in different neighborhoods of Hyderabad regarding GHG emission relevant aspects like transport and customer distances, facets of climate change adaptation like the impact of changed trading volumes during the rainy season, the importance of Kirana shops for the population, and the willingness to cooperate among Kirana shop owners. The results show which climate relevant advantages follow from traditional retail and which further advantages can be reached through enhanced cooperation among Kirana shops, forming a base from which to develop a model for such enhanced cooperation.

Another Background study – whose empirical part started in April and was completed on May 11th 2009 – will, after its assessment, provide some important insights on the behavior of electricity consumers and their supply relationships in Hyderabad. Additionally, investigations on back-up mechanisms (e.g. generators) for periods of insufficient or low quality energy supply (voltage fluctuations), subsequent efficiency lacks and the willingness to cooperate among involved actors are integrated into the study.

Until the Milestone in May 2010 a model for Kirana cooperatives will be developed on the foundations of the Background Study. In this process, beside the primary Stakeholder-cum-Partner Roshan Vikas, the German partners of CULT-GEO (WP 2.2), PIK (WP 1), PTV und RESS (WP 3) – as well as other Indian advisory partners like the Federation of Andhra Pradesh Chambers of Commerce & Industry and the Archarya N.G. Ranga Agricultural University (ANGRAU, Department of Agricultural Economics and Dept. of Food/Nutrition) – will be integrated into the study. The model will form the basis for testing and implementing pilot cooperatives.

Analogously, a model for associations of electricity consumers will be developed. The respective theoretical approaches will be empirically backed by results from the aforementioned study. Cooperation for this will take place with WP 3.2 (RESS), WP 6 (NEXUS) and Indian partners, e.g. the Standing Committee of Tarnaka Residents Welfare Association to examine cooperation praxis and conditions (forms of cooperation, contract types, by-laws, auditing, social capital, mental models, cooperative laws).

2. Applied practice orientation and transferability

The *previous Deliverable* (see Deliverable 2009 / IFG / No. 15) were devoted to exploring the pre-conditions for Kirana cooperatives and electricity consumer associations (socio-economic conditions and willingness to cooperate), gathering the necessary information for the planned practical implementation of the cooperatives. Until May 31st 2010 the aforementioned models for practical implementation will be developed based on qualitative *and* quantitative data (see Background Studies) and the input of the German and Indian partners. Herewith, the feasibility of cooperative behavior and the relevance for climate change, energy efficiency, and other economic and social aspects are taken into account. The reasons why such models of cooperation are *universal* and can be transferred to other Megacities and other countries in a similar stage of development has already been explained in section 2.4 of the overall coordination report.

3. Involvement of local actors and relevant institutions

So far, IfG worked with the Confederation of Voluntary Associations (COVA) and the Roshan Vikas Foundation that until now has predominately operated women's credit cooperatives. Together with Osmania University and the Roshan Vikas Foundation IfG conducted the Background Study and Stakeholder Analysis in the area of retail and Kirana shops. Furthermore, contact has been made and expert interviews were conducted with the following organizations

and actors: Federation of Andhra Pradesh Chambers of Commerce and Industry (large scale retail), Hyderabad & Secunderabad Retail Dealers Association (small scale retail), Archarya N. G. Ranga Agricultural University (ANGRAU, Department of Agricultural Economics and Dept. of Food/Nutrition).

The main secondary stakeholders are the Department of Consumer Affairs, Food and Civil Supplies of the Government of Andhra Pradesh, which enacts regulations regarding food and retail, and the Department of Agriculture and Cooperation to which the Roshan Vikas Foundation and the cooperatives have to deliver yearly reports on their financing. Additional stakeholders include other governmental departments that enact regulations in the area of retail, such as the communal General Hyderabad Municipality Corporation (trade licenses), the Labor Department, the Legal Metrology Department and the Health Department.

In the energy sector, the IfG closely cooperates with RESS. The stakeholders involved in cooperative relationships include all relevant governmental actors (APGENCO, APERC, APCPDCL, APTRANSCO, NEDCAP, GHMC, GoAP, etc.), universities and research institutes (TERI, CESS, SRT Rural Institute, University of Hyderabad), NGOs and associations (SESI, NEERU, IWEA, Energy Conversion Mission, FAPCCI, Standing Committee of Tarnaka Residents Welfare Association, PMGER, Lok SATTA, Prayas, DRUM, USAID) and private enterprises (Elitser IT Solutions India Pvt. Ltd., Surya Energy Systems Ltd.). Local consultants that were involved in other energy sector studies have cooperated in producing the aforementioned study. IfG made cooperation agreements with core partners. They will help by gathering data, consulting and conducting expert interviews (APERC, APCPDCL, GHMC, FAPCCI). Cooperation with these partners is of crucial importance to gain a critical overview on the energy sector.

Beside the Roshan Vikas Foundation the following Indian partners will work closely with the IfG until the next Milestone in May 2010: Andhra Pradesh Chambers of Commerce and Industry and the Archarya N. G. Ranga Agricultural University (ANGRAU, Department of Agricultural Economics and Dept. of Food/Nutrition). The following stakeholders will be embedded into the model design process: Department of Consumer Affairs, Food and Civil Supplies of the Government of Andhra Pradesh, the Department of Agriculture and Cooperation and other departments that are responsible for the retail sector, such as the General Hyderabad Municipal Corporation, the Labor Department, the Legal Metrology Department and the Health Department. For the energy sector appropriate partners will be chosen, too. There will also be a strong cooperation with the Tarnaka Residents Welfare Association within the project and its implementation: a preliminary discussion on this cooperation with the president of the Association Dr. Rao Chelikani took place on May 13th in Berlin.

4. Capacity Building

The stakeholders in the pilot cooperatives will be strengthened in their management capabilities and competitiveness, enhancing their ability to develop an *understanding of the climate relevance of their business models*. The Background Studies were designed so that they have already been able to reveal the basic strengths and weaknesses within the relevant research areas and capacities to act and have identified positive and negative behavioral patterns regarding the heightening of willingness to cooperate. The Capacity Building will incorporate targeted cooperative-specific training schemes. Additionally, a *Training-on-the-job* should hopefully lead to long term changes in behavior. A survey on the demand for Capacity Building will be integrated into the implementation phase of the pilot cooperatives, taking place in coordination with the aforementioned German and Indian partners. As important institutional and organizational innovations the cooperatives will be part of the *Crafting-Rules-by-Discourse (CRD)*.

