0. Summary of the project

The past decades saw the Global South experiencing only a few locality-based resilience planning efforts which would have generated problem-solving practice models. While focusing on global city competition and urban economy efficiency, extremely marginalised urban poor have been often excluded from national planning agendas, including those in the Philippines and other Southeast Asian countries as Thailand and Vietnam. Despite the enactment of the Philippine Disaster Risk Reduction and Management Act of 2010 (RA 10121), urban risk governance and risk-based land use planning to reduce inhabitants' socio-economic vulnerability and enhance community adaptive capacity for resilience has not gained wide efficacy. Metro Manila and its large proportion of inhabitants in disaster-prone informal settlements critically challenge resilience planning. Based on back-to-back workshops in 2018 and 2020 of LIRLAP, LIRLAP further advances and pursues its research agenda for the R&D phase, including five work packages: WP 1 Risk trends and resettlement options with urban growth, WP 2 Resilient upgrading, WP 3 Resilient retreat, WP 4 Mainstreaming upgrading and retreat strategies, WP 5 Capacity building, and WP 6 Project coordination. As outreach programme, LIRLAP outputs are to be tested in Thailand and Vietnam.

The five WPs use the consortium's problem-solving expertise on: embedding the LIRLAP approach of relocation and upgrading in urban development with pilot projects in Metro Manila; co-producing climate-adapted upgrading and retreat with inhabitants to elevate livelihoods; mainstreaming locally viable strategies for upgrading and retreat and integrating resilience planning via stakeholder capacity building training and a joint

PhD between Dortmund and SURP. LIRLAP integrates sustainable spatial development and risk management. With primacy of urban risk governance, the project seeks long-standing strategies on: sustaining resettlement sites via urban livelihood strategies; balancing spatial structure of Metro Manila and its surrounding provinces as a chance to accommodate future resettlement; preparing for peripheral mid-size cities' growth; diverging urban growth into other regional metro-areas so as to augment growth absorption.

1. Justification of the identified research problems

1.1 Updated regional compelling problems, planning trends and actions

Several decades of research have produced considerable understanding of the complex and interacting consequences in global climate change and fast urbanization development (IPCC, 2014; UN, 2017; UN ISDR, 2015). However, strategic risk reduction has not gained significant traction in international debates, particularly in regard to informal settlements in the Global South where large gaps remain between the demands of the public, scientific studies and policy making (Garschagen, et al, 2020). While often recognised as one of the most 'at risk' places, informal settlements have been directly and indirectly excluded from many formal mechanisms, thereby increasing their vulnerability to disaster events (Morin, et al., 2016, Greiving, et. al., 2018). This challenge is particularly troublesome for the emerging economies of Southeast Asia, including the Philippines, Vietnam and Thailand, where the prevalence of urban informality coincides with extremely high exposure to natural hazards (Birkmann and Welle et al. 2016).

Three countries with conjunction of informality and hazard exposure were selected to demonstrate a breadth of historically and socio-politically grounded planning contexts in which to test the transferability of the project's findings and proposed interventions. The first is **Metro Manila**, the largest and fastest growing metropolitan area in the Philippines. The metropolitan region has for decades attracted migrants from the provinces, not all of whom have found formal housing. National Economic and Development Authority (NEDA, 2017) estimated that there were 2.8 million informal settlers, or 556,526 informal settler families (ISFs), living in Metro Manila. Out of this number, 104,000 families are occupying areas identified as danger zones, such as railroad tracks, garbage dumps, canals, rivers and creeks and other flood-prone areas. Many of these ISFs also live in houses made of light materials, and are therefore particularly vulnerable. Despite precarious living situation of ISFs, disaster-driven upgrading is currently still a low priority of planning in the Philippines. In large part, however, the focus is on finding large scale, lasting solutions to this perennial problem, yet these often entail moving people far from their livelihoods and thus have limited success. As such, there is a demand for new approaches and insights that help gain traction on how to support effective upgrading and/or retreat in the current context.

Hanoi has a similar situation to Metro Manila in terms of hazard exposure (mostly flooding) and re-developing informal settlements. Along with the growing trends of immigration into Hanoi, it has been argued that hazard prone areas are an integral part of Hanoi's migration dynamic in that it creates the conditions that have made certain areas of the city affordable, thus enabling settlement by low-income people (Anh and Minh, 2017). The majority of migrants, especially migrants without residential registration, have no opportunity to access any information from district-level authorities, and thus lack the support that is being offered to formal residents from district-level government. Though informal settlements are decreasing as a result of the general

rapid economic development in Vietnam, informal constructions and un-registered settlers are among the most vulnerable groups to natural hazards. Recently, local government interventions have sought to 'manage migration' through policies designed to restrict entry to the city and to 'manage disasters' by reengineering the city's infrastructure (Anh and Minh, 2017). However, it is still unclear how the remaining informal settlements would be redeveloped, for instance, with upgrading or relocation measures, and for whom they would be redeveloped. As in Manila, the informal economy and informal settlements are deeply connected yet the legal-political context of the Socialist Republic of Vietnam is quite different from the one in the Philippines.

Bangkok has considerable experience with slum-upgrading and social housing projects for the urban poor since the 1970s (Bhatkal and Lucci 2015). However, until today, an estimated 25% of the urban population of Thailand remains living in slums or informal settlements (World Bank, 2020), and 30% communities in Bangkok were defined as informal settlements (BMA, 2018). Accordingly, Bangkok and its hinterland are appropriate research sites to learn from decade-long experiences and to exchange with Metro Manila given its awareness on spatial planning-based disaster risk management. Though Thailand has different development capacities due to its socio-economic performance, it has less concrete disaster risk management regulations and enforcement than the Philippines and particularly Vietnam. Additionally, the country struggles to address pressing trends such as social inequality, an ageing society, and environmental degradation. In the light of the projected growth of Thailand's urban population from 50% today to 70% by 2050 (UNDESA, 2018), the vulnerability of urban systems and the resilience of Bangkok's informal settlements are central challenges.

1.2 Current international debates and scientific discourses

Disasters in cities can arise from natural processes such as weather-related (hydro-meteorological) and geophysical hazards and also from human actions. Understanding disaster risks is a prerequisite not only for disaster risk reduction but also for the assessment of climate change impacts and planning effective adaptation strategies (Winsemius, et al., 2016). Mainstreaming DRR has gradually gained momentum since 1994 (UNDRR, 2019). However, since 2015 there has been a further push to ensure that disaster risk management and climate change resilience are coherent, including in relation to key post-2015 global agendas, notably: The Sendai Framework of Disaster Risk Reduction, the Paris Agreement's Adaptation Goal, the Sustainable Development Goals and the New Urban Agenda (Sandholz et al., 2020).

Spatial planning is one sphere in which such coherence is being sought. It plays an important role in climate change adaptation and disaster risk reduction, particularly as it offers tools to proactively and preventively reduce risk (ADB 2016; Greiving 2016). To develop the full potential of spatial planning, it is key to understand the determinants of climate risk – hazard, exposure and vulnerability – and how physical climate and environmental changes interact with the human socio-economic system (Birkmann und McMillan 2019).

As poorly managed urbanisation is a major driver of disaster risk (Hossain et al. 2017) and poor people are often the most severely affected by disasters (UNISDR 2017), it is imperative to introduce risk-informed spatial planning mechanisms in areas where the urban poor mostly live (UN 2017). In many countries of the Global South, these areas are informal settlements. Here, residents are typically more exposed to climate events with very limited risk-reducing infrastructure, low-quality housing, and limited capacity to cope (UNISDR 2009, IPCC 2012, Revi et al. 2014, Morin, et al., 2016; Tran and Krause, 2019). They live outside

the ‘formal’ system, consisting of planning regulations, land-use systems and laws that are meant to build and safeguard resilient structures, settlements and systems (Satterthwaite et al. 2018).

A central challenge is, therefore, to formalize or at least to integrate informal settlements into planning systems and provide the urban poor with ‘risk-reducing’ infrastructure and services, two central features named by the IPCC’s Fifth Assessment for achieving risk reduction (Revi et al. 2014). Aligned with this is an attention to supporting physical infrastructures to have better quality despite the rapidity of growth (UNDRR, 2019) this could include for example the improvement of the accessibility, the sanitation, the building material or the water and energy provision. However, across sectors, vulnerability reductions can also be supported by other services, including through improved health care, emergency aid, disaster management or policing.

Across sectors, activities of this nature can be referred to as ‘upgrading’ of informal settlements. They fall into the categories *protection* and particularly *accommodation*, named as major coping mechanisms for coastal communities exposed to natural hazards in IPCC’s Fifth Assessment Report (AR5). The last category of ‘retreat’ is, in contrast, referred to as an option of last resort and becomes a justifiable strategy when the other adaptation options are not practicable – although this may be assessed on different timescales, either as immediate or in future due to climate change impacts such as sea level rise (IPCC 2014, Greiving et al 2018).

Upgrading and planned (managed) retreat are not merely a matter of providing settlements with infrastructure and services or clearing hazard areas while settling people somewhere else in less exposed areas. Both interventions interfere with urban development processes, such as exclusion, rising land prices, public transport planning, gentrification and functional separation. Moreover, existing upgrading and retreat strategies widely ignore the specific susceptibility of the various elements at risk and fail to assess whether they are worth protecting (Doberstein et al. 2020). Thus, they tend to upgrade or relocate entire settlements instead of distinguishing between those elements which may remain and others for which a relocation is required (so called selective retreat, see Greiving et al., 2018).

Urban resilience narratives are distinctly influenced by engineering-based understandings, focusing on critical infrastructure needs and risk reduction as main points of intervention. CIs are addressed at the global level as one of the seven global targets of the Sendai Framework for Disaster Risk Reduction: “Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030” (UN ISDR 2015, 12). Thus, CI should also be considered for both, upgrading and retreat due to their systemic criticality and worthiness of protection (Kruse et al, in print). This is particularly emphasised by the New Urban Agenda (UN 2017, p.21).

Adaptation strategies such as upgrading and particularly retreat imply radical changes to livelihoods. Beyond engineering questions then, resilience planning needs to take into account therefore that informality not only describes where people live, but also their behaviours and practices, as livelihoods can depend on informality and informal-formal linkages (Chen 2012; Satterthwaite et al. 2018). Pelling and Garschagen (2019) emphasize the importance of focussing the attention on the social vulnerability of the most vulnerable and to measure success by supporting their needs. At worst, if resilience measures and planning ignore lived realities of the urban poor, then, interventions might render marginalized communities even more vulnerable (Ziervogel et al. 2017). To illustrate these challenges, upgrading could imply obtaining an official land title and

address, being able to open a bank account, having to pay (higher) rents but could also bring the danger of being displaced by processes of gentrification. Resettlement on the other hand, necessarily entails a change of location. Therefore, it is a central task to investigate the social and economic changes that accompany such spatial changes. As informal settlers are both highly exposed and mostly very vulnerable, it needs to be analysed how to reduce their risk exposure through either upgrading or retreat or a combination of both, thus to minimise informal settlers' vulnerability and ultimately their risk through attentiveness to all aspects of vulnerability, capacity, as well as exposure.

2. Applicants' expertise profile

TU Dortmund University (Prof. Greiving), University of Stuttgart (Prof. Birkmann) and the LMU University (Prof. Dr. Garschagen) have been collaboratively involved in various relevant national and international research activities. The partners have already implemented the preparatory and definition phase for this project together with the local partner SURP.

TUDO's Faculty of Spatial Planning is Europe's largest planning school. The Director of the Institute of Spatial Planning, Prof. Greiving, has been involved in about 30 international projects (six times as coordinator) and is author of about 250 publications. Prof. Greiving's main fields of expertise are spatial planning and disaster risk, risk assessment and governance, climate change adaptation and demographic change. The faculty runs the International Master Programme, "Spatial Planning for Regions in Growing Economies" (SPRING) with partner universities in the Philippines, Chile, Ghana and Tanzania. The SPRING Programme has variously been recognised as a beacon of academic excellence and international academic collaboration, e.g., by the award of the quality label of being one of the Ten Best International Master's Programmes at Germany's Universities in 2006. In this context, TU Dortmund University and UP SURP experience a long-standing continuous collaboration in the field of academic teaching and research (Annex 9.2 Memorandum of Understanding 2018-2023).

The **University of the Philippines, School of Urban and Regional Planning** (UP SURP, TUDO's subcontractor) is the Philippines' premier academic institution for graduate education in the field of urban, regional, and environmental planning and related disciplines. The School's mandate is to strengthen the capability of national and local government agencies, as well as, private organizations, to find solutions to their development problems and improve human settlements and their environments through comprehensive integrated planning. Moreover, it is mandated to develop, hone, and make available a pool of capable professional urban and regional planners. UP SURP continues to uphold its four-fold mandate of quality graduate education, research, training, and extension services. UP SURP holds extensive socioeconomic competences in the fields of urban financing, economic shelter planning and the cost and benefits of resettlement planning.

The **Institute of Spatial and Regional Planning at University of Stuttgart** stands for a research and teaching agenda that aims to enhance the sustainability and resilience in spatial and infrastructure development. A focus is on international comparative studies that deal with selected questions of environmental change, spatial development and planning systems. Against this background they develop in cooperation with national and international expert networks (Intergovernmental Panel on Climate Change, International Strategy for Disaster Risk Reduction, Academy for Spatial Planning and Research) strategies

that are designed to address new challenges and risks of environmental and social transformation processes in a timely manner. The Head of the Institute, Prof. Birkmann, has written more than 100 scientific publications, five of which are books he has edited, and has published numerous peer-reviewed articles (for example, also one in Nature). He has made important contributions to international scientific reports, such as the IPCC Fifth Assessment Report (IPCC 2014).

The **Urban Futures & Policy Research Unit (UFP)** of Thammasat University (subcontractor) is a dynamic research unit specialised in urban sustainability and urban development policy and planning. The focus is on research that leads to positive changes in urban society and empowers key actors in the city. The research unit focuses on multidisciplinary research and promotes capacity building of the urban society in order to cope and adapt with uncertainty and build resilience and sustainability. The unit took part of various international research activities on urban climate resilience and sustainability with grants from the UK, Canada and Germany. It also participates in the Thai research networks on climate change and has published book chapter and peer-reviewed articles**.**

The **Unit on Human-Environment-Relations at the Ludwig-Maximilians-University's Department of Geography in Munich** develops, tests and disseminates inter- and transdisciplinary methods for the assessment of future development paths and risk trends in the context of natural hazards, environmental change and societal transitions. Based thereon it evaluates competing options for risk reduction, sustainable development and transformation. The section collaborates closely with decision makers and stakeholders from the local to the global level, e.g. urban administrations or United Nations programs. The chair holder, Prof. Garschagen, has led numerous international research projects in the field of disaster risk, especially in Asia (e.g. TWIN-SEA, DeltAdapt, World Risk Report). Amongst other duties, he has been serving as an IPCC Lead Author in the Special Report on Ocean and Cryosphere in a Changing Climate (SROCC) and the Sixth Assessment Report (AR6). His research findings have been published in high ranking journals, e.g. twice in Nature or in Climatic Change.

The Faculty of Land Management at the **Vietnam National University of Agriculture (VNUA),** as the subcontractor in Vietnam has established a local team of researchers, including from the Vietnam Ministry of Natural Resources and Environment (MONRE), the National University of Civil Engineering (NUCE) and the Southern Institute of Social Sciences (SISS). VNUA is top-rated for research, teaching, and extension in Vietnam, and has a strong commitment to supporting sustainable development in the country through its educational programs, research projects, and innovative outreach program. Its relationship with the ministry (MONRE) in developing land-use plans holds advantages for the project to identify suitable land at the regional level for resettlement and upgrading as well as to mainstream the project findings with policy making.

The interdisciplinary team of **KaiserIngenieure**, consisting of civil engineers, landscape architects, urban planners and technical staff, has been developing development and management solutions for customers of all sizes and from all sectors since 1994. More than 750 projects have already been successfully completed among others for public and private clients in the areas of rainwater management, flood protection and geo-hydrological expertise.

3. Articulation of the project goals, objectives and sustainability

3.1 Indicators for the description (in quantitative or qualitative terms) of the project's success

- Number of participants of the stakeholder workshops (minimum 50 participants)
- Number of training workshops in the Philippines, Thailand and Vietnam (three each) as well as other Southeast Asian countries as Indonesia and Malaysia (one each)
- Number of admitted PhD candidates of the joint PhD (five candidates per batch)
- Political approval of upcoming pilot studies on upgrading and retreat by responsible Local Government Unit (LGU) in Metro Manila
- Uptake of scientific results and innovations, indicted through publications in leading international journals.
- Uptake of policy advice and planning support by key institutions in all three countries.

3.2 Sustainability of the project

The sustainability of the project is related to its phasing-out with an exit strategy (political approval of proposed pilot studies by LGU) and to the period after project´s funding as well as its impact related to the SDG. The established international network can continue to work together since LIRLAP has established a well-working platform beyond administrative boundaries and hierarchies. Once the training programs are conducted successfully and are well received, the local partners can provide the training programs after LIRLAP since they are based on user fees covering the costs. The same applies to the joint PhD, whose funding of candidates is not part of LIRLAP, but the joint PhD agreement will continue as legal base for candidates. The research results of LIRLAP will provide the base for further activities of the partner universities and stakeholders in terms of master thesis, dissertation and future research activities. Identified solutions will form the core elements for the potential subsequent two-years implementation phase.

LIRLAP will contribute to the following SDGs: **Goal 11** sustainable cities and communities, **Goal 13** combat climate change and its impacts as well as **Goal 4** quality education, **Goal 10** reduced inequalities and **Goal 17** partnerships for the goals.

3.3 Indirect economic, social and/or political impact

- Reduction of exposure and vulnerability of livelihoods of ISFs being prone to natural disasters.
- Raise of risk awareness and coping capacity of the community to reduce losses.
- Improvement of learning capacity of Governmental Institutions and decision-makers. Key achievements of WP 4 (mainstreaming) and WP 5 (capacity building) will influence the long-lasting disaster risk management practices in the Philippines, in Thailand and Vietnam on the ground.
- Enhancing the planning capacities and planning processes of LGU towards resilient cities.
- Post-graduate academic cooperation to enhance local capacities and knowledge as well as development and dissemination of innovative approaches.

3.4 Relevance of the project to the funding goals of the call

For urban resilience planning, knowledge gaps that need more research exist regarding the interactions between urban development, disaster risk reduction, climate mitigation and climate adaptation (Satterthwaite et al. 2018). These knowledge gaps exist particularly in the emerging countries in Southeast Asia. The Philippines is one of the countries most at risk to natural hazards and extreme events according to

international studies and assessments (Garschagen, et al. 2016), such as the WorldRiskIndex 2019 (Bündnis Entwicklung Hilft and IFHV). At the same time, the country is experiencing massive urbanization, not only in its capital but especially in its small and mid-sized cities (Garschagen and Lankao 2015). LIRLAP widens its geographical focus to the further, similarly exposed neighbouring countries Thailand and Vietnam. Therefore, it is particularly essential in the three countries to link disaster risk reduction, spatial planning and comprehensive urban development in order to create a basis for the implementation of the Sustainable Development Goals (see 3.2.). The New Urban Agenda (UN 2017) "commit ourselves to strengthening the resilience of cities and human settlements, including through the development of quality infrastructure and spatial planning […], especially in risk-prone areas of formal and informal settlements […] including the rehabilitation and upgrading of slums and informal settlements. We will also promote measures for strengthening and retrofitting all risky housing stock, including in slums and informal settlements, to make it resilient to disasters, in coordination with local authorities and stakeholders."

Positioning informal urban development within formal planning procedures with the complementarity of both informal and formal institutions is a tough challenge. The urbanization process in the Philippines as well as partly in Thailand and Vietnam is characterized through informality and the absence of effective formal urban planning institutions and tools. It means that hazard-prone areas cannot be effectively kept free of settlement development and that the existing building stock is widely physically fragile and creates a real threat for its inhabitants in case of extreme events. Consequently, on-site upgrading is an important adaptation strategy and a major research focus of LIRLAP. The other adaptation strategy in the focus is retreat. The off-site developments in the course of retreat have manifold socio-economic implications however, they are often preferred on the political agenda. For both research pillars applies that a sound evidence basis is required (see priority 1 ("Understanding disaster risk" of the Sendai Framework, UN ISDR 2015). The February 2020 workshop successfully brought Vietnam and Thailand into the debates. As an active member of ASEAN, they share the common goal of mainstreaming disaster risk reduction in the development process of ASEAN countries (since 2009). Therefore, the project's objectives gained acknowledged understanding. It is paving a way for decision-makers to have a sound knowledge of taking appropriate actions as the call emphasises. The proposed project focuses primarily on the areas "risk management of extreme events and natural catastrophes in rapidly growing cities and peri urban regions", but investigates also on the area "integrated urban planning". The importance of mainstreaming disaster risk management into urban planning has recently been underlined by the effects of the COVID-19 pandemic. Particularly informal settlements pose risks for the inhabitants as well as for controlling the pandemic. Nevertheless, also the established resettlement sites for the urban poor and the people living in danger zones are challenging. As of preparing this proposal, thousands of households at various resettlement sites (of National Housing Authority with at least 250.000 families in Luzon) may further slide into extreme poverty in the duration of COVID-19 out of a deficiency of sustained social protection. This is aggregated by unsolved root causes of resettlement programmes including host-LGUs' inability in basic service provision and integrating resettlers in the local economic system. Accordingly, LIRLAP intends to contribute to the following discussions:

- Addressing disaster risk via spatial planning, particularly in settlements that are most affected and least provided with the formal system of risk-reducing planning mechanisms

- Addressing efforts for resilience building while focussing on reducing social vulnerability. As the most vulnerable live in informal settlements, their lived reality and livelihood outcomes are at the centre of the studied interventions
- Support mainstreaming to facilitate actual impact and translate the scientific findings into capacity building, decisive policy advice as well as into transmissive knowledge.

4. Description of the designed work packages and planned research activities

4.1 Results and conclusions from LIRLAP Definition Phase (as by end of June 2020)

Overall conclusions: The definition phase has strongly confirmed the rational and necessity of the LIRLAP work. The feasibility on the proposed approach has been approved. Thus, there is no doubt that the intended work plan can be successful implemented. The partnerships have been strengthened. All local partners are highly reliable and have proven to deliver high quality output. Key scientific results will be published by a SI in Sustainability on “Sustainable Development of Urban Regions” (Guest editor Prof. Greiving).

WP 1: Risk trends and resettlement options with urban growth: Drivers for past urbanization as well as possible future trends for the Manila metropolitan region were identified by evaluating past urban growth by a satellite-based evaluation (e.g. Landsat). The key drivers were compromising based on a trend analysis: urbanization rates, population growth and migration patterns as well as a visual cataloguing of informal settlements. Also, spatial data from a study of households living directly on the city's main waterways were used. In addition, a prototype of an urban growth model using SLEUTH was set up in the second half of the definition phase. This exercise showed that establishing such a model is in principle possible for Metro Manila. An overview of relevant literature, data availability and urban growth models was compiled. The state of research has been comprehensively analysed and evaluated to enable socio-economic scenarios. As next step, the modelling was examined to determine whether sufficient data for indicators of certain driving forces are available. These secondary data sets (coming from international and Filipino data sets, mainly from government, NGO and UN sources) consisting of data on the labour market, private companies and economic sectors, the level of social expenditure (share of national wealth), the average household income, the employment rate, the minimum wage, labour productivity, property values and the availability of social infrastructure such as schools were examined by LMU.

WP2: Resilient Upgrading: A complete inventory of key actors and their institutional constellation was established and used for the first workshop in February 2020. Involvement of private sectors was raised as crucial because of their deciding role in driving Metro Manila´s urban development in infrastructure investment and resilience achievement in risk funds channelling. The stakeholder list will be continuously updated for the second workshop and the R&D phase. Based on the multi-dimensions of upgrading, case selection criteria concluded, among other criteria, ISFs’ views on risks, their coping capacity and their social acceptance of upgrading as pivotal. Other criteria were settlements’ existing infrastructure and their potential integration into the surrounding urban fabric, etc. It was disclosed that in-situ upgrading versus retreat has a low priority for the government and there is no holistic approach regarding sustainable livelihoods and leveraging upgrading to a city-region level. Four types of in-situ upgrading were identified: 1) housing structure improvement (using durable materials, adding second floor, etc.); 2) community infrastructure

provision (basic service installation, e.g. waste collection, community hall establishment); 3) land use adjustment (via reblocking); and 4) new construction on-site within the same settlement (via rollover upgrading). In addition, there are legal instruments for securing property and land tenure, which ISFs consider quite important to them.

WP 3: Resilient Retreat: A screening of the actors relevant to the topics of resilient retreat and resettlement was undertaken. Emphasis was also on embedding the topics in the context of urban development planning, climate change adaptation and disaster risk reduction management (linked to WP 2). The screening was carried out through an analysis of existing and planned upgrading and relocation projects and their actors involved. In addition, official legal documents such as the National Housing Act or the Department of Human Settlements and Urban Development Act were evaluated according to official responsibilities and hierarchies. The findings led to a preliminary stakeholder matrix which represents the network of all stakeholders involved in resilient urban development planning at the national, regional, local and civil society levels. It provides an understanding of the complex governance structure of the Metro Manila region. Existing and planned programs and over 100 resettlement projects in Metro Manila and in the neighbouring regions Central Luzon and Calabrazon were identified. A literature review on the measurability of resilience and the success factors of resettlement projects was carried out. Remarkably, there is not any observed consideration by guidelines or practise of selective retreat. Final output will be a settlement typology on retreat and resettlement projects.

WP 4: Capacity building and dissemination: A review and analysis of existing training courses and a capacity needs analysis was undertaken. Two course curricula on the topics of *Integration of Community Resiliency in Urban Shelter Planning and Management* and on *Smarter Urban Governance for Settlements Development Planning and Management* were developed, their evaluation by experts and a marketing strategy are planned for the second half of 2020. The content and the legal framework of a joint PhD program was clarified by bilateral discussions with the Director of Postgraduate Studies from SURP and its counterpart at TUDO. A comparative analysis of the doctoral regulations, admission criteria and doctoral courses is completed. A draft of a joint PhD agreement was coordinated with the TU Dortmund legal office. It has been positively discussed within the PhD committee of the Faculty of Spatial Planning at TUDO and the Director of Graduate Studies at SURP. A signed agreement between TUDO and SURP is scheduled for the end of the definition phase. Potential partners in Thailand and Vietnam were identified on the basis of existing successful cooperation and qualifications and were invited to the interim results workshop in Manila in February 2020. This workshop with 50 local experts in risk disaster management from all levels aimed at creating a sound basis for the planned workshops in October 2020, for knowledge validation and screening of feasible strategies as well as for project´s outcomes dissemination.

4.2 Research conceptual framework and planned activities for R&D phase

As shown by Figure 1, LIRLAP takes a dynamic perspective and assesses the impacts of future urban growth and densification scenarios in Metro Manila on, first, the future growth of informal settlements by means of urban growth models considering the urban morphology and socio-economic factor and, second, on the future availability of land suitable for receiving resettlement (WP 1). Moreover, the R&D phase analysis lessons learnt from other countries and deeply by fieldworks on on-site upgrading of informal settlements and on retreat options, enhanced by knowledge transfer to and from Thailand and Vietnam. This knowledge leads

to two pilot studies for resilient upgrading and resilient retreat designs on the ground (WP 2 and WP 3) and to guidelines for resilient upgrading and resilient retreat. This package will serve for mainstreaming upgrading and retreat in urban risk management (WP 4), assessing local policies in SEA and disseminated to relevant stakeholders. The same applies to tailor-made training courses and a joint PhD program with UP SURP where knowledge and solutions will be generated and transferred and disseminated (WP 5).

4.3 Elaboration of five designed work packages of the R&D phase

WP 1: Risk trends and resettlement options with urban growth (**LMU,** SURP, Month 1-48)

Objectives: Based on the results from the definition phase, this work package aims to analyse and assess the influences of urban growth and social-economic development on the risk changes of informal settlements in Metro-Manila. In doing so, the previously developed urban growth model using SLEUTH will be refined with considerations of building types, urban morphology classes and social-economic development scenarios (Shared Socio-Economic Pathways - SSPs). In a next step, the refined urban growth model will integrate the risk trends of informal settlements with different resettlement options, in close cooperation with WP 2 and 3. By completing this, the model will be able to simulate and project future development of informal settlements and the associated risk trends in several well-defined urbanization and social economic scenarios. A refined version of the model will then be transferred to the partner cities Hanoi and Bangkok. It is expected that certain adjustments of the model would be necessary in these transfers considering that the cities differ much in physical urban environment and social economic contexts. In the second half of the project period, WP 1 will implement bottom-up qualitative scenario analysis through several workshops that involves stakeholders of national actors, city actors, and local practitioners at the four case cities. Meanwhile, the developed bottom-up scenarios will be used to validate the modelling outputs and so to further facilitate the application of research/modelling results into practice. Beyond that, the results and new methodical developments are also prepared for training and teaching content and disseminated in a larger region for transfer.

Task 1.1: Refinement of the urban growth model with urban morphology for Metro-Manila (LMU, 1-7 month) Building on an extensive analysis of the urban environment, this task will first assess the urban building types and morphology classes using remote sensing data in Metro-Manila. These data will provide more specific and accurate information on the situation on the ground, particularly the building status in informal settlements. The urban growth model will integrate these urban morphology data to better reflect the real situation of local settlements. Field investigations and data collection are planned together with WP2 and 3 to get a common understanding of the ground context and validate remote sensing data.

Task 1.2: Refinement of the urban growth model with SSP scenarios for Metro-Manila (LMU, 8-15 month) Global scenario assumptions (the Shared Socioeconomic Pathways, SSPs) need to be revised for their use in regional or local assessments. This task will extend the global SSPs to Philippines and the metro Manila areas as well as the two transfer cities. A first order draft of the scenario storylines and assumptions will be developed in a desk study which will then be validated and refined trough a small expert validation within the project team – as well as later discussed and validated against in a wider stakeholder workshop (Task 1.5). Using these qualitative scenario storylines and translating them into quantifications of the parameters in the SLEUTH model of Task 1.1, the latter will be refined so as to being able to later model scenarios based on the local SSP storylines (Task 1.3). Parameters related to informal settlements and the availability of land suitable for resettlement will be particularly considered here.

Task 1.3: Model risk trends using refined urban growth model under different resettlement or in-situ upgrading options (LMU, 16-24 month) The refined SLEUTH model of urban growth (Task 1.1) and the SSP-type storylines (Task 1.2) will then be used to model and simulate risk trends at the metro Manila area under different adaptation assumptions. Based on the modelling and scenario approach, this task investigates which influence the future urban growth in Manila (spreading and densification) as well as adaptation measures (in-situ upgrading and resettlement) will have on the growth and disaster risk of informal settlements and newly resettled areas. Hazard information will be contributed from existing data sets in the Philippines and other two partner countries. The work of this task supports the integration of the measures developed in the other work packages with regard to the resettlement and upgrading of informal settlements. Furthermore, the modelling output will generate scenarios for future developments in city growth and risk spread, against which the measures from WP2 and WP3 can be evaluated for their robustness.

Task 1.4: Transfer of the risk trend model to partner cities in Thailand and Vietnam (LMU, 18-36 month) With the extensive modelling work done at the metro Manila region, this task will transfer the modelling approach to the comparable partner cities in Southeast Asia, i.e. Hanoi and Bangkok. Based on the data collection and study findings done by the local project partners in these cities (details indicated in WP 4), urban growth projection and risk trends can be simulated on a comparable basis in these cities. Therefore, this task will generate comparative analysis and assessment of risk trends among the three case cities. The result will enable a deeper understanding on risks of informal settlements and thus help to propose feasible and transferable risk reduction strategies/measures for decision-support.

Task 1.5: Validate risk trends across different scenario frameworks (LMU, 29-42 month) In the last step, the modelling results will be assessed and discussed against bottom-up qualitative scenarios. The scenarios will be developed by carrying out workshops with local stakeholders. To do this, the project will use the

stakeholder networks established in the definition phase and earlier months of the R&D phase, to cover a broad scope of national actors, city actors, and local practitioners at the case cities. These workshops will be organized together with other WPs and our local research partners in each city. Eventually, the developed bottom-up scenarios will be used to validate the modelling outputs and thereby facilitate the application of research/modelling results into practice.

Task 1.6: Cross-country analysis, comparisons, and integration (LMU, 42-48 month). Lastly, a comparative analysis of the risk trend modelling results from the different cities will be conducted considering theoretical, methodological and empirical aspects in order to provide guidance for further transfer.

Results/Deliverables
D1.1: Set of urban morphology classes for informal settlements in Manila
D1.2: Set of SSPs regarding urbanization trends in Manila and the other transfer cities
D1.3: Complete model simulation of risk trends under various urban develop scenarios in Manila
D1.4: Model simulations of risk trends under resettlement options in two partner cities
D1.5: Bottom-up urbanization scenarios in the three case cities
D1.6: Compilation of policy- and practice-oriented report on urban risk trends in the three case cities

Milestones
M1.1: A refined urban growth model for Metro-Manila (15th month)
M1.2: Complete model simulation of resettlement risk for three partner cities (36th month)
M1.3: Validated resettlement options with urbanization and risk trends (42th month)

WP 2: Resilient Upgrading (**TUDO,** partner SURP, Month 1-48)

Objectives: WP 2 emphasizes on-site upgrading as a process of enhancing ISFs' livelihood skillsets, community coping capacity to withstand natural calamities and shocks; and building up risk governance among multi-tier stakeholders. Objectives accentuate a community-based approach counterbalanced with planning interventions. Given current on-site upgrading's low priority as a planning intervention, WP 2 strives for a resilience responsive plan with structural, cohesive and actionable upgrading activities. This plan wants to make safety requirements and livelihood improvement compatible. It particularly addresses issues of reducing overlapping vulnerability of ISFs in high-risk areas; securing ISFs' asset ownership and household livelihood opportunities; optimizing settlement space for adaptive resilient (re)uses and supporting proximity concept for ISFs to access resources and employment with improved mobility. Importantly, increasing ISFs' resilience to natural disasters shall not be compromised by upgrading measures (e.g. infrastructure installation, housing unit construction, tenure arrangements) without considering the necessary precautionary measures. Results of WP2 provide for WP5 up-to-date training contents and topics for the PhD programme.

Task 2.1: Cross-country upgrading comparative analysis (TUDO, Month 1-6) Theoretically, risk governance under the different planning contexts in the Philippines, Thailand and Vietnam will be investigated in order to prepare the subsequent transferability test of the findings from Metro Manila. Institutional arrangements which work under various political-legal systems (e.g., state owns all lands in Vietnam and the undefined concept of informal settlements) will be ascertained. Importantly, understanding of upgrading *per se* will be contextualised in the three countries.

Task 2.2: On-site upgrading activities with a temporal-spatial analysis in Metro Manila (SURP, Month 4-9) There has been limited study on the transformation of informal settlements as transition areas in both spatial and temporal views and their post-upgrading evaluation reflections on disaster risk reduction. Experts in the February 2020 workshop commonly suggested to expand WP 2 investigations on 1) underlying driving

factors of precedent on-site upgrading activities, key players and planning implications; 2) socio-economic and eco-spatial transformations of those upgraded settlements and their integration levels with disaster risk reductions and resilience over time; 3) challenges and unsettled issues from precedent upgrading activities; 4) evolution of methods and practices up to current upgrading activities, e.g. the Zonal Improvement Program applied to old upgrading sites in Metro Manila in 1980s.

Task 2.3: Focal sites for on-site upgrading for city-region wide development in Metro Manila (TUDO, Month 7-15) LIRLAP handles hitherto single settlement for upgrading. A step further will include at least two settlements within one city. An urgent need arising is to take stock of focal informal settlements at the city-region level, to be able to clearly identify their critical urban resilience needs under LGUs' mandates. This task will establish a portfolio for LGUs concerning their informal settlements' risk-related future (via WP 1) and roles in citywide development, which is currently pressing on the government agenda. Such exercise factors LGUs' planning engagement and keeps WP2 bearing realistic spatial scales with retained population for resilience tests (Task 2.4), also as a reference for upscaling and replicability in Bangkok and HANOI (Task 2.5). Equally important, this task visualizes feasibilities of in-city relocation (e.g. being practiced in Metro Manila) or potential selective retreat (via WP 3), which requires clear differentiations regarding susceptibility of various land use types and targeted informal settlements and their adjacent surroundings. Output of this task can be proactively tied to the cities' development and investment plan.

Task 2.4: Pilot site out of focal sites in Metro Manila (SURP, Month 8-24) With the purpose of testing resilience on ground in Metro Manila, this task appraises focal settlements identified in Task 2.3 concerning 1) the potential integration level of upgrading with the city; 2) community assets, vulnerability, livelihoods and internal cohesion and 3) community top resilience priorities. Besides investigating root causes of vulnerabilities to disasters, ISFs' perceived risks and impacts are equally significant to be weighed through in-depth fieldwork (e.g. ISFs' risks' acceptance level, impacts' specificity, severity, immediacy and community needed time for recovery). Appraisals and community resilience priorities will be evaluated during community consultations and sites assessment visits. Based on the assessments, one initial site shall be jointly determined for pilot study among the project team, the respective LGU and the community.

Task 2.5: Knowledge transfer from the Philippines to Vietnam and Thailand (**TUDO** and partner countries, Month 25-35) Consistently, methods and results of above activities in Metro Manila need to be applied and transferred to Bangkok and Hanoi on a) inquiring on-site upgrading with a temporal-spatial line based on Task 2.2; b) establishing an urban resilience portfolio of high-risk informal settlements, due to be integrated with citywide development based on Task 2.3; and c) conducting evidence-based assessments for polite site identification based on Task 2.4. Results of Task 2.1 provide a clearly defined legal-political contexts regarding the transfer and potential applications in both countries.

Task 2.6 Piloting locally viable resilience design for implementation phase (TUDO**,** KaiserIngenieure and SURP, Month 35-42) A settlement-level design to pilot upgrading measures out of results of Task 2.3 and Task 2.4 is realized in this task. Currently, there are no building codes for high-risk informal settlement areas in the Philippines. In Thailand it discerns a deficiency of both building codes and hazard maps. Through **gaming simulations**, Task 2.6 will identify critical factors for and test sites for informal settlements' resilience. With involvement of KaiserIngenieure, LIRLAP pilot resilience design endeavours to seek solutions based on

communities' interests in improving proximity to employment and resources, alternative routes for extra evacuation and retro-fitting of public space (including rollover upgrading for settlement structural and resilience-proof layout adjustment). Community-driven upgrading approaches will uphold the principle of being counterbalanced with a planning framework and government interventions. The physical application of **test** sites is subject of the subsequent implementation phase.

Task 2.7: Cross-country upgrading findings and guidelines (TUDO, Month 43-48) Both theoretical and empirical aspects using comparative analysis are to be addressed in this task along with results of Task 2.6, substantiating applications of upgrading guidelines in Task 2.7. Feasibilities of upgrading/up-scaling from community level to city-region wide development policies will be analysed and their applicability under different legal-administrative environments (in Thailand and Vietnam) is to be proved and compiled to concretise **upgrading resilience guidelines**. A legal-political approval of these guidelines and selected test sites is expected by the respective LGU.

Final deliverables of WP 2
D 2.1 Report on cross-country upgrading policies and practices among the partner countries
D 2.2 Report on temporal-spatial analysis of upgrading activities in Metro Manila
D 2.3 Portfolio of focal sites for citywide development in Metro Manila
D 2.4 Report on polite site assessments in Metro Manila
D 2.5 Report on resilient upgrading knowledge transfer from the Philippines
D 2.6 Proposal of resilient design in the pilot site in Metro Manila
D 2.7 Report on disaster-driven upgrading activities and upgrading guidelines in three countries

Milestones of WP 2
M 2.1: Identification of focal sites for citywide development in Metro Manila (15th month)
M2.2: Selection of one pilot site in Metro Manila (24th month)
M 2.3: Completion of knowledge transfer to Bangkok and Hanoi (36th month)
M 2.4: Political approval of guidelines and pilot sites in Metro Manila (48th month)

WP 3: Resilient retreat (**Ustutt**, SURP, Month 1-48)

Objectives: WP3 has the objective to incorporate and apply the monitoring framework (output of definition phase) in practice and to provide resilient solutions for retreat by developing concrete model-projects with relevant stakeholders. The framework enables determining the resilience-building and the cost-benefit effect of the analysed retreat typologies and subsequently developing best practice examples or model-retreat projects in a gaming simulation. Henceforth, the model-projects need to go through a multi-stage process by investigating the planning phase, the transition phase as well as the potential phases of development and incorporation. It is intended to finalize the fieldwork in Manila with the development of a retreat design in a pilot study. Based on provided data on suitable land by the urban growth model, a concrete resettlement site will be developed that reflects the best resilience and likewise cost-benefit prospect. The research in Metro Manila is framed by a cross-country analysis and a compilation that consult cases and experiences in the partner countries Thailand and Vietnam. An achievement will be a retreat guideline that draws on the intensive fieldwork and reflects various conditions and approaches of the Southeast Asian countries.

Task 3.1: Cross-country resettlement comparative analysis (Ustutt / Month 1-6, 26-28) The analysis discusses retreat experiences and tests variables deduced in the Philippines in settlements in the partner countries Thailand and Vietnam. Prior to the first kick-off workshops in Thailand and Vietnam, a literature review and systematization of policies, strategies and projects regarding resilient retreat will be undertaken for both

countries. A second period of the cross-country analysis between month 26 and 28 will further substantiate the different planning contexts and lay the foundation for the fieldwork in the partner countries.

Task 3.2: Data acquisition in field phases (SURP / Month 1-9, 14-16, 20-21, 26-30, 33-34) Primary data is generated in tasks 3.2, consisting of a large-scale household survey and expert interviews. The actual fieldwork is divided into a sequence of survey phases in the Philippines, as well as the partner countries and commences with a preparatory period. The **preparatory period** is designed to decide on the specific research sites and to develop the household survey. Consideration is taken that the selection process for the studied relocation projects ensures that every retreat typology is represented by sufficient sample size and reflects the different temporal stages of projects. Concurrently, the household survey will be developed to match the indicators of the monitoring framework and to investigate the interrelation between spatial change and social change. The **fieldwork** consists of three **household-survey phases** in Metro Manila and one phase with **focus group discussions** and, if feasible, small-sample household-surveys in each partner country. The sequential approach in the Philippines allows addressing potential data gaps as well as learning and calibrating the survey and ultimately the evaluation framework where appropriate. Attention will be paid on the comparability of the results. The fieldwork includes **expert interviews** with relevant stakeholders.

Task 3.3: Data analysis – framework test (Ustutt / Month 10-13, 16-19, 22-25, 31-32, 35-36) Every block of the field phase is followed by an respective analysis phase on processing and statistical analysis of the gathered data. The analysis is done by applying **descriptive statistics** to provide a summary of the data and compare the different typologies regarding their resilience building and cost-benefit. At a later stage, in-depth-analysis of inferential statistics will be performed to investigate the causes for the calculated effect and on relations and hypothesis. Accordingly, the framework is able to determine the differences between the typologies as well as which characteristics of each typology reveal which significance for the specific outcomes.

Task 3.4: Pilot study for resettlement design (Ustutt / Month 35-42) Task 3.4 aims to simulate a holistic retreat process and to develop a model-project based on the calculated best prospect for resilience building and cost-benefit. The task starts with a **gaming simulation** in Metro Manila that comprises different formats with different actors, including national authorities, decision-makers, academia, people's representatives, developers and architects. It is intended to reproduce a comprehensive and realistic relocation process along the typical relocation stages. Accordingly, the planning phase of the model-project will investigate participation activities, the site selection as well as the design and the construction of the new settlement. The focus of the subsequent phases of transition, potential development and incorporation will be on restoring livelihoods, integrating the new settlers into the host-community, incremental improvements and the estate management. Substantial elements of the gaming simulation are the performance of a hazard scenario and the simulation of a model-project that includes selective retreat, a strategy with innovation potential that has not been considered in the Philippines yet. The accumulated experiences serve as a foundation to layout a concrete **pilot project** in a suitable area that has been detected by the urban growth model (WP1). The pilot project, developed with the help of KaiserIngenieure, can function as template for actual to be implemented projects, including feasibility calculations and specifications of costs as part of the implementation phase.

Task 3.5: Cross-country compilation and findings & retreat guideline (Ustutt / Month 43-48) The cross-country compilation draws the full circle by presenting findings on resilient retreat from three Southeast Asian

countries. As a major intention of LIRLAP is to facilitate actual impact and translate the scientific findings into decisive policy advice, a **resilient retreat guideline** will be produced as final product.

Results/Deliverables
D 3.1 Report on similarities and differences of retreat policies and practices among the partner countries
D 3.2 Large-scale household survey and expert interviews are conducted in the Philippines whereas smaller-sample fieldwork is conducted in the partner countries
D 3.3 Evaluation of Manila's retreat typologies is done based on the collected data
D 3.4 Model-project is developed in a pilot study
D 3.5 Resilient retreat guideline is produced
Milestones
M 3.1: Start of the household survey in Manila (month 7)
M 3.2: End of the fieldwork in Manila – framework test implemented (month 24)
M 3.3: End of the field work in the partner countries (month 36)
M 3.4: Model-project is developed (month 42) and politically approved by involved LGUs (month 48)

WP 4: Mainstreaming upgrading and retreat strategies (**LMU**, Ustutt, SURP, Months 1- 48)

Objectives: WP 4 develops and formalizes the LIRLAP approach into a user-friendly, coherent conceptual framework, methodology and practical mechanism for mainstreaming upgrading and retreat DRR strategies. It has two functions: 1) To support evidence-based progression from modelling risk to decisions about choices of strategy, particularly in relation to retreat and upgrading. 2) To help users to more clearly identify opportunities and limitations to mainstreaming the approach across sectors, scales (Young, 2010) and their different planning horizons, requiring them to identify sectoral silos and governance gaps and develop plans to address these. The **cross-sectoral workshops** will facilitate informal institutional engagement between sectors land-use planning, disaster-risk management, and others such as housing and social assistance.

Task 4.1: Conceptual framework development for LIRLAP protocol on mainstreaming upgrading and retreat in urban risk management (Lead LMU, Months 1-12). In a first steps, a conceptual framework will be developed considering national planning frameworks, inter-governmental agendas including the Sustainable Development Goals and donor positions on best practice, including UN agencies and the World Bank. The conceptual framework will be refined during fieldwork in Manila in Month 4 with SURP, and presented during the kick-off events in Thailand and Vietnam in month 7 (M1). Building on this and work conducted in review tasks 2.1 and 3.1, in months 7-12, partners in Vietnam and Thailand will contribute to assessments of mainstreaming of DRR in their respective countries as well as through supra-national agreements. Comparative analysis will be used to identify a common conceptual framework, with a view to generating a framework applicable across all of Southeast Asia, and potentially more broadly.

Task 4.2: Procedural component development for LIRLAP protocol on mainstreaming upgrading and retreat in urban risk management (LMU; Months 1-27). In parallel to the above conceptual development, methodological and practical developments in WPs 1, 2, 3 during their R&D phase in Manila will be recorded and analysed to ascertain procedural inter-dependencies across the WPs in order to develop a 'step-by-step' guide that will help assist different stakeholders at multiple levels (horizontally and vertically) understand the mainstreaming process and where and how they can contribute or may be affected. **Expert interviews** on the history of mainstreaming will also be conducted in all three countries. The procedural and conceptual elements will be combined to finalise the LIRLAP Draft Protocol, and design an accompanying iterative feedback mechanism for its evaluation-in use for tasks 4.3 and 4.4).

Task 4.3: Using and evaluating the LIRLAP Protocol to guide mainstreaming the Philippines (SURP, Month 28-42). In months 28-34, SURP, with the support of LMU, will use the Draft Protocol to assess mainstreaming in the Philippines for the purposes of the two pilot studies (Tasks 2.6 and 3.4), identifying necessary stakeholders to engage, policies to confront or align with, and requirements to be met. From this they will produce a case-study mainstreaming road-map report (Deliverable 4.2), provided to stakeholders at the Manila M3 workshop. In months 35-42, as the pilot studies are underway, the feedback mechanism will be used to evaluate the Draft Protocol.

Task 4.4: Evaluation of the LIRLAP Protocol's transferability to other countries (LMU, Months 28-42). In month 28-36, the Draft Protocol will also be provided to partners for iterative evaluation-in-use in the Hanoi and Bangkok cases studies in years 3 and 4, including as a first step identifying the multi-level and multi-sectoral stakeholders critical to effective transfer and mainstreaming of the LIRLAP approach. These stakeholders will be asked to formally evaluate the Draft Protocol, via feedback on the protocols' principles, assumptions, and steps, in the national workshops for M3. Two specific outcomes of the meeting will be: a) The protocol will be revised and a final version published in an open access format, to enable easier uptake, and participating stakeholders will be invited to champion the approach they helped co-produce, both in-country and in the wider region (Deliverable 4.1); a mainstreaming road map will be produced for each case-study (Deliverable 4.2) and one comparative report highlighting mainstreaming issues and opportunities for DRR stakeholders active in the wider region, including the UN Habitat Regional Office for Asia and the Pacific (ROAP), the International Federation of the Red Cross (via the Climate Centre), and the ASEAN AHA Centre.

Task 4.5: Dissemination and outreach (SURP, Month 1-48).

SURP will be the focal point for dissemination and outreach to ensure the LIRLAP approach has a presence in the region during and beyond the life of the project. During the project, SURP will release biannual briefs and communicate policy results to policy makers and civil society at all levels within the Philippines, and Thailand and Vietnam (via Partners); organize stakeholder and public dissemination events in Manila, Bangkok and Hanoi, in collaboration with project and national partners, in the final year of the project (Milestone 4.2). With support from LMU and Ustutt, SURP will also present the protocol, a regional mainstreaming report (D4.1 and 4.2) and other relevant project outputs to intergovernmental agency and INGO representatives in the region. Finally, the wider LIRLAP team will publish research findings from WP1, WP2, WP3 and WP5 (Tasks 1 and 2) in academic publications, all members of LIRLAP will incorporate the research outcomes in scientific presentations at national and international conferences.

Results/Deliverables

D 4.1: (Final) LIRLAP Protocol for Mainstreaming Upgrading and Retreat
D 4.2: Case-study Mainstreaming Roadmaps and Regional Comparative Report

Milestones

M 4.1: Draft LIRLAP Protocol
M 4.2. Final dissemination events (Manila, Hanoi, Bangkok) (month 48)

WP 5: Capacity building (TUDO, all partners and subcontractors, month 1-48)

Objectives: Resilient informal upgrading will only be successful and sustainable, if accompanied with capacity building of stakeholders at the local and national levels as well as in the academia and if results will be broadly disseminated and utilized. This includes the development, conduction and evaluation of training

courses for key stakeholders involved in disaster risk management and urban governance. Moreover, the establishment and conduction of a joint PhD between TUDO and SURP on topics of urban planning and resilience and disaster risk reduction and management with regular PhD workshops is planned.

Task 5.1: Development and conduct of training courses (SURP) (month 1-48) To sustain the knowledge and good practices of disaster risk reduction and management as well as urban governance in the Philippines and the partner countries Thailand and Vietnam, strengthening stakeholders' capabilities and their networks are crucial. Therefore, two training courses were designed with SURP based on a training needs assessment undertaken in a multi-stakeholder's participatory approach.

a) Course on the Integration of Community Resiliency in Urban Shelter Planning and Management. The course aims to introduce the learners on the different aspects of community resiliency and how it can be integrated in urban shelter planning and management. It will cover community resiliency, settlements planning and development for informal settlement families, resiliency and urban governance.
b) Course on Smarter Urban Governance for Settlements Development Planning and Management. The course aims to introduce the learners on how urban governance matters in settlements development planning and management. It will cover topics such as the dimensions of urban governance, policy challenges, urban governance in relation to urban financing, urban governance in the context of shelter development for informal settlement families, among others.

In the first year of the R&D phase, these two training courses will be offered to participants and further courses developed according to the training needs and tailor-made for different target groups ranging from ministries, public and private agencies and advocates to local settlers' groups. The first batch of courses will be evaluated and enhanced, if needed. Based on the first courses further thematic courses will be developed and conducted in Manila. The courses are planned to be based on following modules: *Module 1 – Disaster Risk Management; Module 2 – Spatial Planning; Module 3 – Shelter Planning and Management and Module 4 – Urban Governance and new Module 5 - Resilient Retreat and new Module 6 - Resilient Upgrading.* As a next step, the two initial training courses will be modified based on the outcomes of the preliminary offerings. From the second year onwards, the enhanced courses will be annually offered in collaboration with the partners from Thailand and Vietnam as well as in other SEA countries such as Indonesia or Malaysia. For the subsequent implementation phase, an ASEAN climate change training centre in collaboration with the Climate Change International Technical and training Center (CITC) should be established on a sustained basis.

Task 5.2: Implementation of joint PhD between SURP and TUDO (TUDO) (month 1-48) To build up a new generation of local experts on disaster risk reduction and management and urban governance, the joint PhD between TU Dortmund and UP SURP universities is a fundamental step in intensifying academic cooperation. PhD students shall be intensively involved in all research activities of the various WPs. The development of the structure and related courses of the joint PhD by SURP and TUDO was part of the definition phase (see section 4.1). LMU and Stuttgart Universities will be involved in joint supervision as well.

The announcement for the first batch of the joint PhD throughout many communication channels can be launched in 2021 and potential PhD candidates identified for the project's four-year R&D phase. Target group are highly qualified candidates from the Philippines, the partner countries Thailand and Vietnam and the ASEAN region who will work on the topics of LIRLAP. At the same time, potential scholarship organisations

will be contacted by SURP and TUDO, e.g. to secure DAAD in-country and regional scholarships. A fundamental part of the joint PhD is the offer of **joint PhD courses** which are required at both universities which will be tailored-fit to each candidates' needs. The same applies to joint supervisions by professors from all involved universities. Both tasks will be undertaken in consideration of the academic specialization at all partner universities and the relevant PhD regulations in place. Regular **PhD workshops** twice a year conducted by TUDO and SURP will enhance the quality.

Results/Deliverables:
D 5.1: Training course curricula and training courses conducted and evaluated
D 5.2: Report on a joint PhD between TU Dortmund Institute of Spatial Planning and the University of the Philippines School of Urban and Regional Planning

Milestones:
M 5.1: Knowledge exchange workshops in Thailand and Vietnam took place (month 7)
M 5.2: Start of the training courses and first batch of PhD candidates (month 8)
M 5.3. Evaluation of training courses, start training courses in partner countries (month 25)
M 5.4. Evaluation of training courses in partner countries (month 36)

WP 6: Project management (**TUDO**, all partners and subcontractors, month 1-48)

Objectives: This work package coordinates and controls the implementation of the project, including identification and implementation of measures to address timing, resource and management issues.

Tasks 6.1 Project coordination (TUDO + SURP) This task coordinates the cooperation between the German and international partner universities and external partners or institutes. It also manages the most important events of the project, such as the project coordination meetings, practical research workshops and public dissemination conferences. The most important activities within this step are:

- establishing clear coordination structures, including procedures and measures for potential conflict resolution to be laid down in a cooperation agreement among the partners and subcontractors;
- support by subcontractors as local hubs for organizing all local activities and acting as focal point for involving all further local stakeholders,
- organizing and running biannual face-to-face project coordination meetings, including agenda setting,
- Regular telephone or Skype conferences to report on and discuss completed, ongoing and planned activities and preparation of meeting minutes,
- publication and regular updating of information regarding the project, its results and event on the websites and in the respective newsletters of the partners,
- coordination of communication between the project and the funding organization (BMBF / DLR),
- coordination with the other projects supported in the program of BMBF "Sustainable Urban Regions",
- overall monitoring of personnel and financial resources of the project
- Regular reporting to BMBF / DLR regarding activities, results and finances of the project.

At this point in time, there are no known or foreseeable problems or risks with regard to project management – not least because of the long-standing cooperation between the partners. Nevertheless, any problem that might arise is discussed in the regular telephone / Skype conferences and the bi-annual project coordination meetings and agreement an appropriate action is taken.

Task 6.2 Project Progress Monitoring (lead TUDO) This task evaluates the process of all work steps and measures as well as the completion time and the quality of the results. The main measures are therefore:

- monitoring milestones, reports, minutes and other documents and results,
- comparing the intermediate and final results of each project activity with the measurable objectives of the project by an internal review of all deliverables,
- reviewing and tracking the cost and time consumption of each proposed activity and outcome,
- identification and reporting of gaps in resource and time management, as well as between achieved results and the objectives of the project,
- documentation of the results of the above monitoring and control mechanisms.

The results of the interim evaluation of the project progress are included in the minutes of the project coordination meetings as well as in the interim and final reports. In the event of unforeseen deviations from the planned implementation of the project, the measures identified in step 6.1 will be carried out.

4.4 Applied methodologies and methods

The different methods used are described in the respective activities of the above work plan. They include:

- Desktop study including literature survey and development of urban growth model
- Local fieldwork including reconnaissance survey, GIS-based testing of the urban growth model,
- Stakeholder workshops, focus group discussions and participatory mapping with informal settlers,
- Interviews with policy makers and Governmental institutions and NGOs and informal settler families,
- Interactive training courses and consultation of PhD students.

5. Planned cooperation and work-sharing

5.1 High-level participatory transdisciplinary and interdisciplinary cooperation

All local research activities will be designed and implemented in local living labs in close collaboration with those actors which are legally responsible for the relevant tasks and play a role for their implementation. In doing so, the usability of the results can be guaranteed by co-design of the agendas and co-production of knowledge and activities. Besides international support from the Regional Office for Asia and the Pacific of UNHABITAT and support agencies from the Philippines (Annex 9.3), e.g. National Housing Agencies, Department of Public Works and Highways and LGUs for the potential upgrading case settlements are actively involved. This underlines that the project is aware of the existing initiatives in the field of disaster risk management. The same will apply to local institutions and initiatives in the partner countries Thailand and Vietnam. Close interaction among all partners is further guaranteed due to the collaborative character of the workshops: all partners including partner countries Thailand and Vietnam take part in all workshops and bring in their specific perspectives from the tasks they are mainly responsible for. Moreover, all deliverables will pass an internal review process for which those partners/researchers are responsible that were previously not directly involved as authors. By doing so, the consistency of the overall work flow and the relevant results can be guaranteed.

5.2 Partners from Thailand and Vietnam for the R&D phase

For the workshop in February 2020, LIRLAP had invited potential partners for the R&D phase form Vietnam and Thailand who were working in the fields of LIRLAP. In course of the workshop participants from Thailand Urban Futures & Policy Research Unit (UFP) of Thammasat University and Faculty of Land Management of the Vietnam National University of Agriculture confirmed their interest in being partners for the R&D phase and have proved to be qualified partners (see Annex 9.3). The partners will serve as focal point for further research and application of research in their countries with planned local training workshops.

5.3 Envisaged collaboration structure and project management

The TU Dortmund University, University of Stuttgart and LMU Munich will collaboratively perform the work program. Monthly Skype or telephone meetings are scheduled for a smooth working process. The research office of SURP, PLANADES, will act as subcontractor of TU Dortmund University and focal point of all local activities while the partners from Thailand and Vietnam are subcontracted by the two other German universities. PLANADES will receive funding for staff costs, travel, events and equipment. It contributes with **in-kind contributions** of about 50,000 € (10,000 € in case of the two other subcontractors) for the involvement of permanent staff in research and PhD training activities and events, bringing in equipment for events. The subcontractors are responsible for the following activities (Annex 9.2 Cooperation Agreements and offer of services):

- Jointly designing the project and research strategies and methods (all subcontractors);
- Co-organizing events and participating international conferences and publications (all subcontractors);
- Conducting local socio-economic profiling, supervising local fieldwork, managing data and organising travel activities of the aforementioned further local partners (all subcontractors);

- Jointly providing intensive training courses for key stakeholders involved in disaster risk management and urban governance (PLANADES only);
- Running a joint PhD between TUDO and SURP in LIRLAP related and induced topics of urban planning and resilience, urban governance and disaster (PLANADES only).

5.4 Strategy for pooling and integrating various bodies of knowledge

The pooling of different bodies of knowledge and data is achieved through sharing all project data on a project file server (hosted by TU Dortmund University), to which all project partners have access. Data generated in the project will further be made available for all project partners and publicly after key publications have been achieved. All local data will be provided by SURP. SURP has access to all relevant statistical data and manages its own GIS data base. Access is guaranteed (Annex 9.2 offer of services). The integration of different knowledge types is a core component of LIRLAP. All of the assessment steps outlined in the work plan eventually depend on the integration of different knowledge types. The urban growth model, for example, will integrate statistical data from past time lines with expert judgement from key partners in the project. The same holds true for the products in the other work packages. The assessments are therefore truly inter- and transdisciplinary. In addition, frequent meetings via skype and on-site meetings ensure a close cooperation and personal communication between the different partners.

5.5 Strategy for handling potential conflicts

The project partners have been able to build substantial trust amongst each other throughout many previous joint projects. Conflicts are therefore not expected. Nevertheless, all project partners will develop and sign a cooperation agreement before the start of the project. This agreement will set out the rules and regulations to avoid and govern potential conflicts, e.g. with respect to co-publications.

6. Expected results, their potential applications and follow-ups (scientific and commercial)

Key products of WP 2 and 3 are going to be implemented in the subsequent implementation phase:

1. The WP2 pilot study with resilient upgrading design guidelines shall be politically approved by its affiliated LGU which is legally responsible to implement urban housing and development programmes at the end of the R&D phase. It is to be replicated in other upgrading sites of high-risk informal settlements in Metro Manila for city-region wide upscaling. Concrete physical upgrading measures will be tested within the implementation phase and promise also commercial follow-ups for Kaiseringenieure.
2. WP 3 concludes with a retreat guideline. Here, knowledge gap such as strategy of selective retreat is expected to be addressed via joint activities of WP2 and WP3. Furthermore, these guidelines will be applied by a pilot study, to be politically approved by the responsible LGU at the end of the R&D phase. This study will be integrated in real-life planning processes within the implementation phase.

Apart from the potential implementation phase, **all WPs results** of R&D phase are transferrable to partner countries and countries with similar development contexts characterised with rampant urbanisation, co-existence of informality, ineffective planning and high risk and hazard potentials. The R&D phase will seek in **WP 1** for the development of urban growth models with SSP scenarios under different resettlement or in-situ upgrading options for Metro Manila and transfer the risk trend model to partner cities in Thailand and Vietnam as well as validate the risk trends under different scenario assumptions. As final step a cross-country analysis on these topics will be elaborated. **WP 4** via mainstreaming activities will influence policy and decision making

on various planning levels in the Philippines. Particularly, it expects to have impacts on governmental efficacy of promoting risk-informed spatial planning at different operational levels, involved multiple stakeholders and institutions at national and city-regional horizontals. LIRLAP highlights the need for research on disaster risk governance, binding not only those cross-governmental agencies in the individual LIRLAP partner countries, but also to be among ASEAN states. Both LIRLAP partner countries are active members of ASEAN Committee on Disaster Management. As a platform for cross-country academia communications, the project synergizes the understanding on critical regional challenges and solution seeking. This platform via LIRLAP unlocks potentials of utilizing the existing regional mechanism in handling disaster management. **WP 5** focuses on capacity building on the topics of LIRLAP by training courses and a PhD program. The training programs are designed on a cost-recovery scheme and can be executed after LIRLAP. The same applies to the PhD program since scholarships for candidates are not part of LIRLAP and thus the program can continue independently.

8. Proposed working steps and budget plan for the Implementation phase

Based on the final results of the R&D phase (two pilot studies and elaborated guidelines for upgrading and retreat and their political approval at LGU level), the implementation phase aims at two model projects for resilient upgrading and retreat in Metro Manila and neighbouring provinces. Due to the given political support as well as the commitment of the local communities, these model projects are related to jointly elaborated built models for the community to use as blue print for further self-organised building activities as well as for integration of the settlement with its surrounding urban fabrics. Special attention is not only given to disaster prone construction of model buildings, but at the same time to livelihood activities for the community members (space and facilities to conduct income generating activities) as well as better connection to public transport.

Estimated budget for the Implementation phase

- 0.5 position for internal and external coordination (TUDO)
- 0.75 research position per scientific partner and KaiserIngenieure + 1 student assistant each
- 1 full research position + budget for travel and events for PLANADES (about 100,000 €)
- Budget for physical implementation of pilot measures (about 100,000 €)
- Two stays/year in the Philippines (4 times about 7,500 € travel costs per German partner)
- Overall requested budget: about 1.1 Mio. €