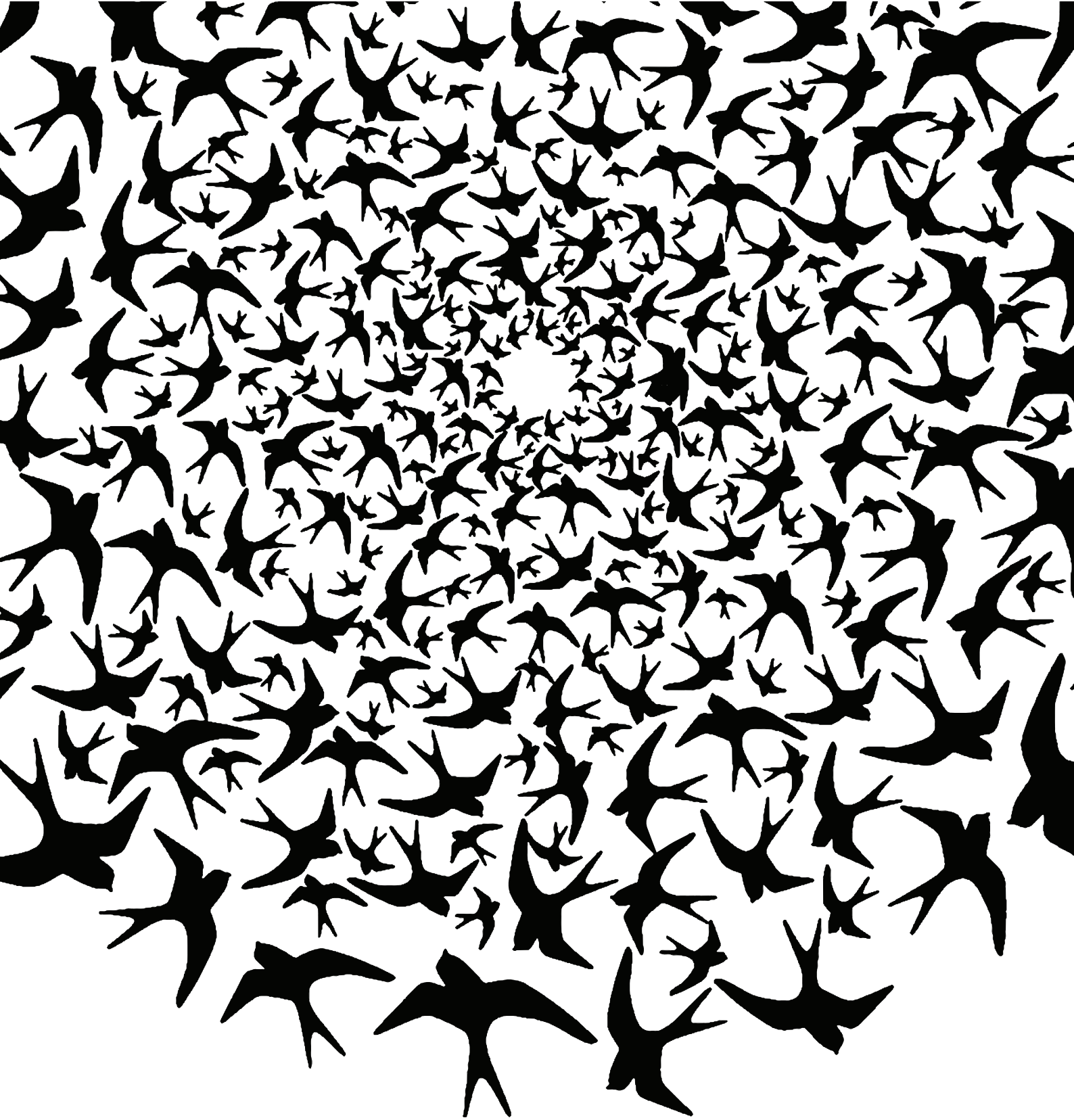

Operationalizing Resilience

Conceptual, Mathematical and Participatory Frameworks for Understanding, Measuring and Managing Resilience.

Ariella Helfgott | School Of Mathematical Sciences | The University Of Adelaide

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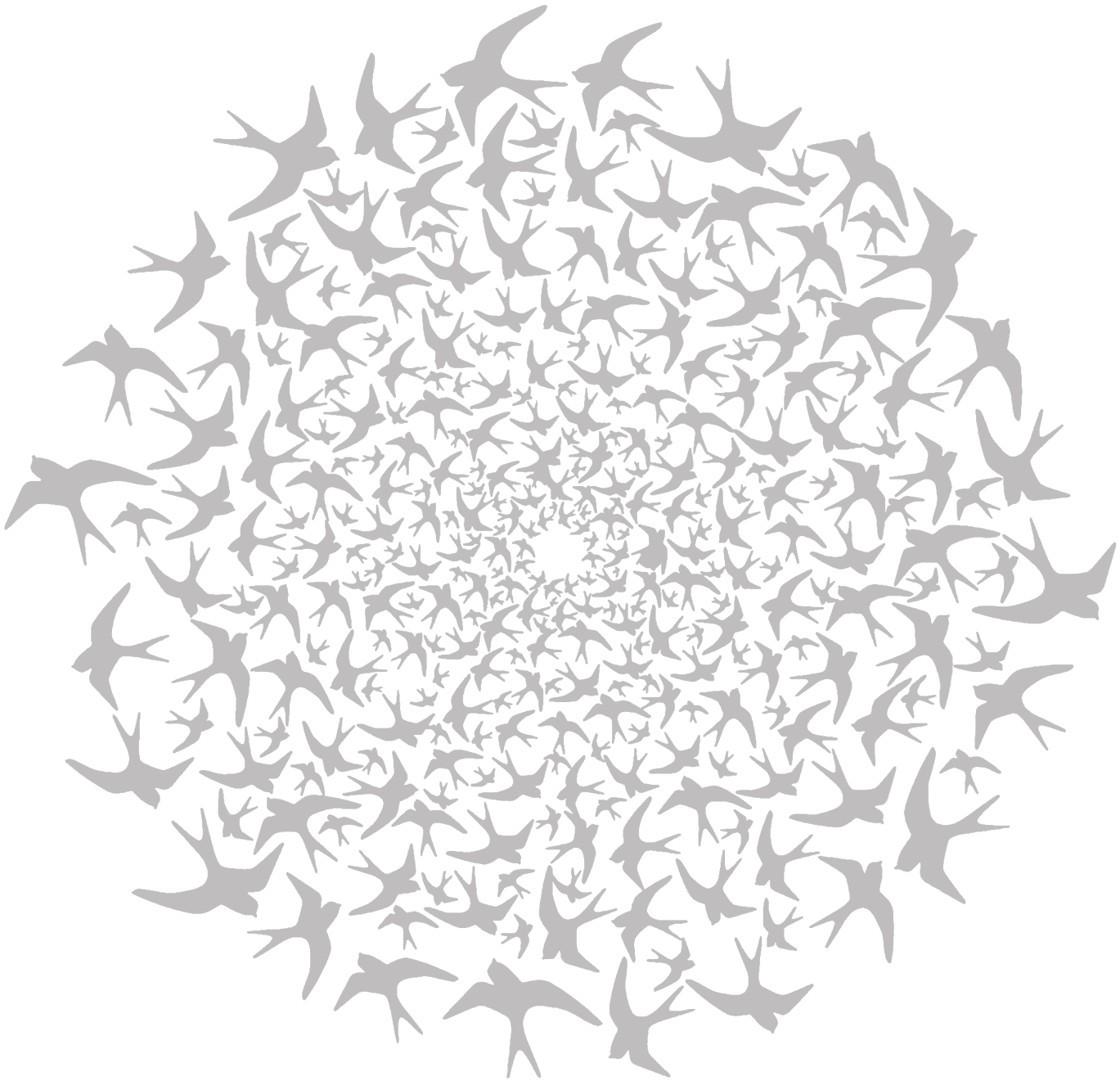

This thesis is dedicated to Arieh and Annita Helfgott,
to whom I owe my resilience.

Ariella Helfgott

School of Mathematical Sciences,
The University of Adelaide

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Abstract

We live in a turbulent world, in which there is growing awareness and concern about of unpredictable and interconnected change across scales. We cannot predict, still less control every source of change that affects systems on which we depend. However, we can aspire to be resilient in the face of change. We can seek to build resilience so that when disturbances happen, those systems have the capacity to absorb, adapt to, utilize and possibly even benefit from perceived disturbances. We can seek to manage systems such that, when they do fail, they fail gracefully; and such that we can effect desirable transitions and transformations. This thesis presents a practical theory of system resilience to facilitate improved management and governance of systems such that their capacity to sustain human and natural capital is enhanced. In order to do so, it addresses questions of what system resilience is, how it is measured, how it is created or destroyed and what we can do, as humans, in order to manage resilience. It provides direct methodological pathways from conceptual and mathematical models of resilience to approaches for characterizing and managing resilience on-the-ground.

Resilience has received an enormous amount of attention across an extensive range of disciplines and sectors. It has become a central theme of research, policy and practice from local to global scales. However, the global spread of resilience has not resulted in global definitions. The inherent conceptual and operational pluralism extant in the field is problematic for those involved in resilience management, planning and decision-making; particularly in the multi-actor and multi-scale processes that are called for by the very concept of resilience. Acknowledging interconnectedness of social, economic, political and environmental systems across scales and levels, taking into account cross-scale and cross-level interactions, and striving towards holism are fundamental aspects of the resilience approach. Thus, frameworks that can handle this diversity across disciplines, sectors and social worlds scales are needed. This thesis has presented systemic frameworks for understanding, measuring and managing resilience that are designed to work with and capitalize on this inherent pluralism and accordingly build capacity to cope with uncertainty and change.

The frameworks presented have been applied tested by the author through the Systemic Integrated Resilience and Adaptation program. Applications to understanding and managing the resilience of agricultural communities in Nepal, for integrated multi-level resilience and adaptation in Ghana and a global level food systems model.Relevant resilience planning frameworks and the approaches taken to cross-level, cross-scale and cross-research program integration have been described. Finally the frameworks are applied to the design and implementation of interdisciplinary resilience research programs. The lessons learned from these applications are discussed, guidelines for understanding, measuring, managing and researching resilience are provided and directions for further research and action are highlighted.

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