Chapter 2: A Synopsis of Research Needs Identified at the Interagency, International Symposium on Cyanobacterial Harmful Algal Blooms (ISOC-HAB)

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Abstract

Evidence indicates that the incidence of cyanobacterial harmful algal blooms (CHABs) is increasing in spatial extent and temporal frequency worldwide. Cyanobacterial blooms produce highly potent toxins and huge, noxious biomasses in surface waters used for recreation, commerce, and as drinking water sources. The Interagency, International Symposium on Cyanobacterial Harmful Algal Blooms (ISOC-HAB) characterized the state of the science and identified research needed to address the risks posed by CHABs to human health and ecosystem sustainability. This chapter provides a synopsis of CHAB research needs that were identified by workgroups that addressed charges in major topic areas. The research and infrastructure needed are listed under nine categories: 1) Analytical Methods; 2) CHAB Occurrence; 3) CHAB Causes; 4) Human Health; 5) Ecosystem Sustainability; 6) CHAB Prevention; 7) CHAB Control and Mitigation; 8) Risk Assessment and; 9) Infrastructure. A number of important issues must be addressed to successfully confront the health, ecologic, and economic challenges presented by CHABs. Near-term research goals include the development of field-ready tests to identify and quantify cells and toxins, the production of certified reference standards and bulk toxins, formal assessments of CHAB incidence, improved understanding of toxin effects, therapeutic interventions, ecologically benign means to prevent and control CHABs, supplemental drinking water treatment techniques, and the development of risk assessment and management strategies. Long-term goals include the assimilation of CHAB databases into emerging U.S. and international observing systems, the development of quantitative mod-
els to predict CHAB occurrence, effects, and management outcomes, and economic analyses of CAHB costs and management benefits. Accomplishing further infrastructure development and freshwater HAB research is discussed in relationship to the Harmful Algal Blooms and Hypoxia Research and Control Act and existing HAB research programs. A sound scientific basis, the integration of CHAB infrastructure with that of the marine HAB community, and a systems approach to risk assessment and management will minimize the impact of this growing challenge to society.

Introduction

The Interagency, International Symposium on Cyanobacterial Harmful Algal Blooms (ISOC-HAB) characterized the state of the science and identified research needed to address the risks posed by cyanobacterial harmful algal blooms (CHABs) to human health and ecosystem sustainability. The state of the science was described by invited experts who addressed specific charges for CHAB subtopics in platform sessions and authored 23 chapters of this monograph. The research needed to develop a systems approach toward the assessment and management of CHAB risks (Hudnell et al. this volume) were identified in seven workgroups whose members addressed specific charges and summarized their findings in additional chapters of this monograph. The workgroups were organized to address the major topic areas of: 1) Analytical Methods; 2) CHAB occurrence; 3) CHAB causes, prevention, and mitigation; 4) Cyanotoxin characteristics; 5) Human health effects; 6) Ecosystem effects and; 7) Risk assessment. The Organizing Committee realized that there was overlap between some of the topic areas, largely due to the interconnections between components on the CHAB pathway (Hudnell et al. this volume). Similarities among some of the charges given to different workgroups were intended to promote characterization of the interconnections from a broader diversity of perspectives. Table 1 presents the research and infrastructure needs identified by the workgroups. Research in each of the Priority Areas is briefly discussed below. More detailed discussions of the state of the science and research needs are presented in the speaker and workgroup report chapters.

Research in the nine Priority Areas identified in Table 1 was considered to be high priority over the long term. The workgroup reports designate each research need as a near-term or long-term goal. The near-term goals are those that do not require other research to be accomplished prior to addressing those goals, whereas the long-term goals are dependent upon the