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JBA's UK-Based Global Climate Risk Practice Sees Growth at Home and in Developing Market Around the World

***JBA** is an environmental risk management consultancy that works across a number of key service streams to manage climate risks now and in the future. JBA works with clients in the public, private and third sectors and our key services comprise flood and water management, provision of natural hazard data, engineering, environmental management and software development. JBA is an independent and employee-owned company committed to improving the natural and built environment and creating sustainable places to live and work. JBA employs 600 FTE staff and has an annual turnover of GBP33 million. JBA is an Amazon Web Services (AWS) Technology Partner.*

JBA recognize that climate change is one of the biggest challenges facing future generations and already affects present-day decisions. JBA has an experienced and expert climate change team comprising risk analysts, software developers, engineers, hydrologists, meteorologists, environmental specialists, designers and modellers. JBA works on international and national projects interpreting climate change projections, providing advice and capacity building on climate change mitigation and adaptation, informing and developing international and national climate change guidance and conveying the technical complexities of climate science in an accessible manner to non-technical audiences. JBA's clients include the World Bank, Asian Development Bank, European Investment Bank, UK Committee on Climate Change, UK, Romanian and Irish national government and local authorities and major rail, port, road and telecoms infrastructure owners. JBA's main areas of expertise and experience in relation to climate change are climate change adaptation and mitigation; flood risk assessment, modelling and management; policy and strategy development; and stakeholder and community engagement.

Rachel Brisley, Associate Director, leading Policy, Strategy and Research focused on climate resilience. She is a PRINCE2 qualified project manager and a qualified planner with significant experience in risk assessment, adaptation planning, evaluation, appraisal, funding, policy and strategy development.

Murray Dale, Technical Director, leading hydrometeorology and climate resilience projects. A member of the UKCP18 Non-government User Group, he has in-depth understanding of climate model outputs used in climate impacts and resilience studies in the UK and internationally.

CCBJ: How has business been for JBA Consulting over the last couple of years?

JBA: We have continued to grow our business in terms of turnover, profit, investment in R&D and in staff skills – funded from reserves and cashflow.

Recently we have been appointed to three national five-year water and environmental management frameworks for the **Environment Agency** in the UK. These cover the engineering appraisal and design of major flood risk management schemes, marine and coastal management and modelling and mapping. We are proud to continue to provide services to the **UK Committee on Climate Change** (CCC) having been a key reviewer for the UK's second climate change risk assessment (CCRA) published in 2017, led numerous pioneering projects that have supported the CCC's annual report to Parliament scrutinizing the UK Government's adaptation progress and involved in CCRA3 (due to be published in 2022) through a future flood risk research project and as co-author for the People and the Built Environment Chapter.

Over the past couple of years, we have successfully delivered **World Bank** funded contracts in India, Tanzania, Suriname, Moldova and Panama and are currently delivering disaster risk management technical assistance for the **Asia Development Bank** (ADB) in Southeast Asia and for the **European Bank for Reconstruction and Development** (EBRD) in Eastern Europe.

CCBJ: What roles does your Climate Resilience division play within JBA? What percentage of your total company revenue does it generate and how has that changed over the years?

JBA: All of JBA's business is focused on climate risks with particular expertise and experience in natural hazard data provision and risk management. This ranges from providing global risk datasets, flood forecasting and modelling to flood risk assessment, appraisal, engineering and wider planning, environmental licensing and ecology expertise. Over the past five years we have been increasingly successful in future climate focused contracts ranging from climate science modelling to raising awareness at community level – this constitutes around 5% of our turnover.

CCBJ: JBA Consulting is part of the JBA Group. How does your Climate Resilience division support other members of the JBA Group?

JBA: The components of JBA Group work closely together. Last year, JBA Risk Management® released its new UK Cli-

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Editor- in-Chief Grant Ferrier

Research Analyst Laura Carranza
Managing Editor Lynette Thwaites

Contributing Editors
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mate Change Flood Model, the first of its type available for the UK, which projects that Annual Average Loss for residential properties in the UK could rise by 25-30% over the next 20 years as a result of climate change. The model, which draws on the latest scientific understanding of climate change, will help (re)insurers understand the impact of climate change across the country. It provides quantitative results that supports projections from research and government data that the number of UK flood events causing financial loss will rise between now and 2040.

JBA Consulting also works closely with the JBA Trust – a charity supported by the JBA Group. This includes secondment of staff and support of doctoral and postgraduate research at leading universities on climate risk modelling and adaptation. JBA Trust developed a web tool showing opportunities for natural flood management measures that are a long-term approach to managing flooding and are promoted by UK Government (and others) to help build resilience to climate change.

CCBJ: What innovative approaches is JBA using to solve the complex adaptation and resiliency problems that we face today?

JBA: In helping other organisations to adapt, we have extensive experience in supporting decision-making under uncertainty: because climate model projections are uncertain and there are multiple possible futures, we have developed techniques to support organisations make sense of the spread of possible change amounts and avoid 'decision paralysis'. When 'doing nothing' is not an option, we can also support avoiding under-, over- or maladaptation, helping organisations consider different adaptation strategies that are more sustainable and cost-efficient. JBA Risk Management's climate change modelling is a new and pioneering approach in the UK helping insurers build climate resilience.

We are at the forefront of research into how high intensity rainfall is likely to change in the future. This is a particularly difficult, yet important, research area because high intensity rainfall is produced by convective processes in the atmosphere that need special models to simulate. Our specialists have led research for the UK water industry that has made use of world-leading climate modelling at the Met Office, using a 1.5km climate model to estimate likely changes to flood-producing rainfall in the future. We are now part of a NERC-funded consortium (Future Drainage) looking at how the new UKCP18 high-resolution output will compare with the estimates we produced in 2017. (UKCP18 is the UK Climate Projections' most recent assessment of how the UK climate may change over the 21st century.) This work is important not just for the water industry but anyone with assets at risk of flooding from intense rainfall who needs estimates of how this rainfall is likely to change in future decades.

The UK CCRA is recognized as world leading and we are pleased to have been involved with the CCRA planning process since its inception in 2012. We are currently working with Kent County Council to produce a CCRA for Kent that is one of the first in the UK at this scale. It uses the UK CCRA approach as the basis for its methodology, but we customized this to be relevant to the more localized context.

CCBJ: What are some of the most outstanding projects that you have performed on the past two years?

JBA: For the World Bank in India, JBA has combined with **SECON** of India to bring together a team of experts in rail resilience to extreme weather, climate

change impacts understanding, Indian railways operation and asset management, early warning systems and Indian climate hazards mitigation. We have developed approaches for improving a 1,800km freight railway's climate hazard resilience, now and in the future, including systems for early warning. Key to success with this project was the combination of relevant skills (meteorology and rail resilience) with an understanding of needs of the railway operators for the first time in India.

In the UK, for **Network Rail,** JBA climate scientists and adaptation experts developed a solution to address the need for managing the use of emission scenarios. This drew on our knowledge of climate impacts, our role in the new UKCP18 climate scenarios (we were active members of the UKCP18 Non-government User Group) and a long association with Network Rail and the rail industry. The project outputs provided a practical way of allowing for climate change, making it easier for climate change to be considered in Network Rail asset management and system planning. They help avoid the potential for not adapting at all, or over-adapting, because complexity of information prevents climate allowances being considered, or the wrong allowances being applied.

CCBJ: What growth are you projecting for your Climate Resilience division in 2019 and 2020?

JBA: We see growth in multiple sectors and locations. While climate change mitigation is clearly vital, there is a growing appreciation that adaptation to inevitable climate change is becoming necessary, however much we are able to reduce future warming. For JBA, we are seeing growth in resilience to transport infrastructure and services, as well as resilience in the water and environment sectors. This is a worldwide trend and we recognize opportunities in both developed and lesser developed countries. In the UK we are building from legislation such as the Climate Change Act of 2008 and seeing growth in supporting those organisations who are responding to the Adaptation Reporting Power.

With new climate change scenarios being released in 2018, we see an increase in the need for organisations to make sense of the projections and understand what the changes will mean to their assets and operations. This is requiring a detailed knowledge of climate science and meteorology and we have grown our capabilities in these areas. In lesser developed countries we see significant growth opportunities in supporting government ministries and infrastructure owners to develop climate and sever weather resilience in all sectors. We are addressing this by supporting World Bank and Asian Development Bank projects, using international climate model projections and working in close partnership with countries' national meteorological agencies.

CCBJ: How has your adaptation and resiliency division evolved since 1995 when the company first started?

JBA: Our company's overall goal relates to managing climate risks – from its establishment in 1995 JBA has been developing climate change resilient solutions to floods and other environmental issues. We have incorporated climate change projections into allowances for changes in flood risk and shown the impact of these changes in flood maps showing flood depths, extents and hazards. Through our investment in our staff and tools (IT, digital transformation, massively parallelised computing) we have been able to upscale tools from a catchment/local scale to country and continent scale.

A specific climate change resilience service was developed in 2012, focusing on awareness, policy, national climate risk assessments and climate science. This service combines cutting edge climate science with practical experience of developing projects to build resilience. Stakeholder engagement and communication skills are crucial to convey scientific projections to non-technical audiences, explain their potential impacts and support clients and their stakeholders to increase their own resilience. Our climate resilience work has focused on supporting public sector organisations in the UK and financial institutions overseas. A key component relates to climate disadvantage and the disproportionate impacts that climate change is likely to have on communities that are already vulnerable, whether in developing countries or deprived areas within the UK.

CCBJ: Can you tell us about the Adaptation and Resiliency segment of the Climate Change Industry? What are some trends?

JBA: Adaptation and resilience have often been seen as the poor relation to climate change mitigation – the need to curb future greenhouse gas emissions. However, there has been a slow and growing trend for adaptation and resilience to become recognized as having a greater importance in our response to the climate change threat: we see that governments and organisations are increasingly realizing this. The latest UN Intergovernmental Panel on Climate Chnage (IPCC) Relative Concentration Pathways (RCPs) provide four possible futures for GHG emissions – increasingly it is becoming evident that we are more likely to be heading towards the 'business as usual' RCP8.5 (highest) scenario. This will have enormous consequences for the world with adaptation and resilience being vital. Therefore, we see a growing realization that, firstly, GHG reduction is vital to reduce the impact as much as possible and, secondly, that however much mitigation of impact the world can achieve, we will have to adapt to inevitable climate change. And consequently, there is a recognition that adaptation and resilience is one of the two responses to anthropogenic (man-made) climate change.

The main adaptation focus globally relates to disaster risk management in relation to extreme events and beyond this, the northern hemisphere has focused on flood

and coastal risk management whilst high temperatures and drought have been more of an issue in the south as well as flood and coastal risk management. As temperatures increase and countries in the north begin to experience climate effects previously only seen in the south, there is a need for knowledge transfer and sharing of experience. Developing countries in the southern hemisphere could start to see temperatures that severely impact human health and wellbeing that could lead to climate refugeeism that needs to be managed at a global level.

Public sector organisations have traditionally led the way with varying levels of legislation and regulation in the UK and other countries to try and promote or enforce action. Increasingly as climate risks affect their bottom-line, private businesses are becoming aware and taking action to build their own resilience.

CCBJ: Which major technologies have arisen over the past couple of years for adaptation and resiliency services? What type of technologies are you currently using?

JBA: One very important recent technology is the advent of very high-resolution climate modelling. In the last five years, this technology has been led by just a few climate modelling centers around the world. At the **UK Met Office** (Kendon, 2014), significant developments have been made that have allowed probabilistic simulations of UK climate at very high resolution (2.2km) – convection-permitting scales – that our staff have been using since 2014. Work that our staff have led and remain actively involved in (Dale et al, 2018) has led to recommended increases in climate change allowances for intense rainfall for flood risk studies and has been shown to have significant impact for the UK water industry, affecting not just flooding but spills from combined sewer overflows. Currently we are part of a research consortium using new UKCP18 projections to assess this issue further and provide information for basing new climate allowances on.

Adaptation technologies are also evolving. Our staff have led many projects that have promoted ways of adapting that are sustainable and appropriate for the sector being impacted. Crucially, these adaptation technologies help manage uncertainty in climate projections – helping to avoid under- or over-adaptation, or even maladaptation.

CCBJ: Which countries/regions of the world are experiencing an increasing demand of adaptation and resiliency services?

JBA: All lesser developed and developing countries are increasing their demand for adaptation and resilience services. We see evidence of this in calls for expressions of interest and proposals from a wide range of client sectors.

CCBJ: What opportunities do you foresee in the near future?

JBA: We see particular opportunities in the following areas:

- UK based: Appropriate use of the new UKCP18 climate change scenarios for organisations to continue their climate change risk assessments and decide on sustainable climate change adaptation and resilience solutions
- Globally: Capacity building in understanding and quantifying the extents of climate change threat on all sectors; assistance in development of adaptation options that are sustainable and cost-effective over time and that adopt good practice.

Private sector organisations and infrastructure owners are increasingly building resilience into their own systems and risk management processes and climate change is beginning to become embedded as a 'standard' future risk to be considered alongside population growth, economic development and political change.

Specific issues for policy and decision makers in the UK and globally include the management of too much (flooding) and too little (drought) water in the same locations, increasing temperatures and the impacts of overheating on buildings and health and coastal communities that are not sustainable in the long term and may require relocation.

On a more technical front, high-resolution climate modelling is an emerging trend. With ever greater available computing power, climate models can now be run at scales used in weather forecasting models (i.e. 2km or less) for regional domains. This is important because it can make much better estimates of certain weather types, particularly convective rainfall that can result in flooding. JBA staff are at the forefront of project work using outputs from such models, currently involved in UK research, FutureDrainage.

CCBJ: What regulations are driving the business and what regulatory changes are you expecting in the next 5 years?

JBA: UK environmental and water regulation and legislation originates in the EU with directives related to the management and regulation of water resources, water quality and flooding transposed into UK law. The UK's exit from the EU will inevitably bring some change. Organisations such as the **UK Environmental Law Association** (UKELA) are working together with Government to help ensure that the level of environmental protection, and the ability of citizens to participate in environmental decisions and take action in the courts where necessary, must not be diminished by any future changes to domestic legislation.

The Environment Bill and following Act that will replace EU directives and resulting UK legislation will be of key importance for the UK climate change and wider environmental consultancy industry. The UK Government has stated that it intends to explore options for strong targets

to improve the environment and provisions on air quality, waste and water resource management, and restoring nature. It is likely that this will place the UK 25 Year Environment Plan on a statutory footing.

Currently, the management of water (water resources, water quality and flood risk management) is the key climate change priority in terms of legislation and regulation. Overheating is not sufficiently addressed but if summers like 2018 become more the norm then building regulations will need to be changed to ensure developers consider potential overheating and maximum temperatures for workplaces are identified and enforced. ☼