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Nature-Based Solutions and a Just Transition: Understanding the Jobs, Skills and Training Requirements for NBS to Contribute to the Green Economy

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1 ABSTRACT

This paper evaluates potential for nature-based solutions (NbS) to contribute to a just urban transition, through fair and decent work for people in cities with industrial or high-emitting economies. The idea of a just transition –a move to a zero-emission and sustainable society that does not leave behind the people and places whose jobs and livelihoods rely on high-emitting industries – is gaining signficant attention in international scholarship and policy, including urban policy. However, although there is increasing awareness of the "green jobs" opportunity associated with energy, understanding of the potential for new jobs associated with NbS in the urban economy is more limited. At the same time, there is also a growing acknowledgement that successful urban NbS interventions will require long-term stewardship. Developing a workforce with the skills to maintain and enhance NbS is thus critical if multiple benefits are to be realised.

The role of nature-based solutions in a just transition, and skills requirements for NbS stewardship, are explored through the case of Glasgow in Scotland, United Kingdom. Glasgow is a valuable case as it is a post-industrial former manufacturing and shipbuilding city, which has in recent years suffered deprivation and public health. From an urban planning and policy perspective, city- and national-level climate adaptation and transition plans have given impetus towards a just recovery and transition towards resilience for the Clyde Corridor and for the Glasgow City Region more widely. Glasgow is thus valuable for understanding the jobs, skills and training requirements for NbS, in that it is (a) at a stage where there is a clear policy and planning vision of what NbS deployment in the city region might look like; and (b) home to a large workforce who are likely to need retraining or up-skilling in response to the climate change challenge.

A typology of jobs requried to realise a just urban transition through NbS is developed from review of international scholarly literature, and is used as the analytical framework for the paper. Key job areas that are identified include jobs in construction, land-based sectors, civil engineering and cross-cutting sectors to support societal transformation. Governmental statistics are then used to identify opportunities for particular neighbourhoods or sections of the workforce to benefit from training or upskilling, so that NbS jobs may contribute to just resilience for Glasgow. Existing skilled workers in sectors such as manufacturing and utility supply, which are projected to see declines, may be able to re-skill to support embedding NbS into new-builds and retrofitting in the construction industry. Expanding 'skills passports' to encompass NbS jobs may support this. Data also suggests, however, that in construction- and land-based sectors, there is an ageing workforce and a coming need for replacement labour. Particularly in employment-deprived areas, qualifications in construction, civil engineering and land-based sectors may provide younger people with vocational-level qualifications with an opportunity to develop a sustainable career pathway that will support stewardship for NbS. Moreover, the significance of cross-cutting skills at community level should not be underestimated as support for putting NbS implementation and stewardship into practice.

Reflecting on the urban just transitions and urban NbS policy literature more widely, based on insights from Glasgow City Region, I argue there is a need for particular attention to, and emphasis on, NbS jobs that may be available to sections of the workforce that may be more likely to struggle to find work as traditonal industries are wound down. In other words, there remains a need for more understanding of adaptation and resilience jobs for those with vocational qualifications, alongside the planning and management-type jobs that are perhaps better understood. There is also a need to ensure that understanding of the skills and capabilities for NbS stewardship are integrated into univeristy and college curricula for sectors such as construction and civil engineering, and to protect and update curriucla in areas such as land management and urban ecology Fuller spatial data on workforce skills and adaptation job requirements will help to better understand how the NbS urban green economy opportunity links to the existing and future workforce.

Keywords: climate adaptation; just transition; nature-based solutions; resilience; urban policy

2 INTRODUCTION AND RATIONALE

There is within Scotland and globally rising awareness of the need for consideration of the employment aspects of a resilient net-zero society. The importance of securing fair, decent and environmentally sustainable jobs for workers in sectors likely to be incompatible with climate change obligations in their present form (e.g. oil and gas, steel manufacturing, petrochemicals) has long been argued by trade unions (Rosemberg, 2015) and also by NGOs and political parties with stronger leanings towards environmental and social justice issues (Platform/Friends of the Earth Scotland/Greenpeace, 2020). In Scotland, this trend has been met with acknowledgement at national government level of the imperative to understand the jobs opportunities associated with Scotland's climate response. This interest is reflected in the establishment of a Just Transition Commission, tasked with (among other goals) advising on how Scotland can plan and implement a transition to environmentally and socially sustainable jobs, building on the strengths in Scotland's workforce (Just Transition Commission, 2021). Skills Development Scotland have also produced a climate emergency skills action plan (Skills Development Scotland, 2020) with the goal of identifying opportunities and challenges to developing new, quality green jobs associated with Scotland's response to the climate emergency. At a regional level too, the Glasgow City Region Adaptation Strategy raises the idea of 'just resilience', which includes ensuring workers whose jobs are impacted by climate change are able to requalify and move towards green growth sectors (Climate Ready Clyde, 2021).

The breadth of strategies and policy initiatives outlined above illustrate the growing awareness of the need for quality green jobs and of the opportunities for job creation in areas such as renewable energy and energy efficiency. Nonetheless, bearing in mind that adaptation to a changing climate forms another central component of Scotland's climate response, the potential for jobs associated with climate change adaptation and resilience more widely has perhaps received less explicit attention in Scotland to date.

The purpose of this report is therefore to review elements of recent and ongoing work on "green jobs" in Scotland and the wider UK that are relevant to climate change adaptation and resilience for the Clyde Corridor area of the Glasgow City Region; to characterise the extent to which current policy initiatives and practice may support adaptation- and resilience-linked jobs and training in the Clyde Corridor; and to inventorise programmes which may provide training opportunities for skills related to adaptation and resilience across Glasgow City Region.

Note that a longer and fuller verison of this paper, including underling data tables and fuller discussion (Mabon, 2023) is also hosted as a preprint on SocArXiv DOI: 10.31235/osf.io/fhgm and can be cited as Mabon L (2023) "Jobs and skills for adaptation and resilience in Scotland" SocArXiv DOI: 10.31235/osf.io/fhgm5 Available: https://osf.io/preprints/socarxiv/fhgm5/

3 CHARACTERISING ADAPTATION AND RESILIENCE JOBS

Although jobs related to emissions- and waste reduction tend to be more prominent in the scholarly and policy literature on green jobs, van der Ree (2019) argues that conceptions of 'green jobs' also ought to encompass the protection and restoration of ecosystems and adaptation to the effects of climate change. van der Ree continues that under a changing climate, some new jobs will be created (e.g. natural resource conservation, environmental advisors); some jobs will be eliminated; some jobs will be substituted for others; and that most jobs will be transformed, with workers, operators and managers in sectors including buildings, agriculture and transport learning to manage new technology and operating practices. Skills Development Scotland (2020) similarly categorise jobs under the climate emergency as fitting into: new and emerging jobs (e.g. technologies and actions that did not exist previously); jobs affected by transitions that will need enhanced skills e.g. architects, environmental consultants; and existing jobs that will be needed in greater numbers. Specific to adaptation and resilience, the Green Jobs Taskforce Report (2021) identifies adaptation-related jobs in each of these categories:

- New and emerging jobs: engineering for resilient infrastructure; construction and environmental monitoring; or adaptation finance (insurance and green bonds). Also adaptation jobs and skills for existing sectors such as housing and construction, water, infrastructure, local government, and nature conservation;
- Jobs affected by transitions that will need enhanced skills: heating and cooling (need to consider heat pump installation alongside wider measures for energy efficiency);

- Existing jobs that will be needed in greater numbers: building retrofit sector, to make buildings able to cope with conditions for which they were not designed.

In addition, the Green Alliance categorise adaptation- and resilience-related work as falling within at least two categories: (a) entry-level jobs with transferable skills (e.g. machinery operation, hazard assessment); and (b) high-level academic qualifications at e.g. degree or PhD level for ecological management (Green Alliance, 2021).Typologies and characterisations of 'green jobs' that are explicitly geared towards adaptation and resilience are limited in comparison to those that have been undertaken for climate mitigation and energy efficiency. However, Biagini et al (2014) produce a typology of ten categories of adaptation-related jobs:

- Human or Social Resources or Capital (jobs related to providing training and capacity building);
- Governance and Institutional Management and Planning (jobs related to management and planning for adapting to climate change);
- Changes in or Expansion of Practice or Behaviour (jobs in areas such as land management, rainwater harvesting, invasive species management etc);
- Governance and Institutional Policy Reform (jobs related to mainstreaming adaptation into other areas of policy);
- Information and Communications Technology (jobs linked to developing decision-support tools);
- Climate-Resilient Physical Infrastructure Adaptations (jobs linked to developing physical infrastructure for adaptation and resilience, e.g. retrofitting/constructing buildings, flood defences, sea walls etc);
- Early Warning Systems or Global Climate Observing Systems (jobs linked to developing weather and hydrometeorological systems);
- Climate-Resilient Biophysical or "Green" Infrastructure (jobs in areas such as landscape management and horticulture linked to nature-based solutions);
- Adaptation Related Financial Strategies (jobs related to financing adaptation initiatives and providing insurance);
- Expansion or Introduction of Climate Adaptation-Related Technology (jobs linked to developing technologies needed for adaptation, e.g. water purification).

Biagini et al acknowledge, however, that many of the adaptation actions they identify have in practice so far been focused on awareness raising, public engagement, and capacity-building. The evidence base is therefore more limited for adaptation- and resilience-focused jobs which involve putting adaptation rhetoric into practice through, for example, construction, implementation of nature-based approaches or construction.

4 ADAPTATION AND RESILIENCE JOBS SPECIFIC TO SCOTLAND

The Green Jobs Taskforce Report (2021) identifies adaptation-related green jobs as including flood defences, retrofitting of buildings to be resilient to extreme weather/climate events, nature-based solutions to reduce climate impacts and civil and mechanical engineering for infrastructure adaptation. In their Climate Emergency Skills Action Plan (2020), Skills Development Scotland similarly list a breadth of priority areas, of which three – construction, engineering, and agriculture and land use – are relevant to adaptation and resilience. The aim of this section is therefore to review the existing knowledge and evidence around each of these areas for Scotland and where possible the Clyde Corridor. Table 1 summarises how the 10 types of adaptation actions identified by Biagini et al (2014) map onto the existing skills requirements, supporting policies, and policy/knowledge gaps identified for adaptation- and resilience-focused jobs in Scotland.

Adaptation Category	**Examples of Action**	**Potential relevant jobs for Glasgow City Region**	**Supporting Policies and Initiatives for Glasgow City Region**	**Potential Policy and Knowledge Gaps for Glasgow City Region**
Capacity building	Training/workshops for knowledge/skills development, public outreach and education, dissemination of info to decision makers/stakeholders, Identification of best	-training and capacity-building; -facilitation; -community development and community-level interventions.	SCS CEAP (2020): need soft skills for e.g. behaviour change, stakeholder engagement, communication	

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	practices, training materials			
Management and Planning	Developing an adaptation plan, livelihood diversification, drought planning, coastal planning, ecosystem-based planning, changing natural resource management	-environmental impact assessment; -adaptation planning; -urban ecological planning.	Skills Development Scotland Climate Change Strategy (2020) Business Processes workstream: support for skills in undertaking EIAs. SDS CEAP (2020): Leadership skills to support cultural change and change management as new technologies, behaviours and systems will need embedded.	Frantzeskaki et al (2020): lack of capacity in relation to innovation and entrepreneurship around NBS, so the focus on engineering solutions has led to missed opportunities for biodiversity, open space and health NatureScot (2020): loss of specialists due to austerity.
Practice and Behaviour	Soil/land management techniques; climate-resilient crops or livestock practices, post-harvest storage, rainwater collection, expanding integrated pest management	-woodland restoration and enhancement; -management of invasive species; -ecological engineering.	NatureScot Nature-Based Jobs Report (2020): peatland/woodland restoration; management of invasive species; planning, ecological engineering.	SDS CCAP (2020): need to refresh careers information and pathways into the sector which reflect both future technical requirements and the scope for the sector to contribute significantly towards addressing climate change. This is particularly important in the context of a sector (agriculture/land use) with fewer formal qualification pathways and upskilling opportunities.
Policy	Mainstreaming adaptation into development policies, land-use specific policies, improvement of water resource governance, revised design parameters, ensuring compliance with existing regulations	-adaptation, resilience and environmental management in local (and national) government; -resilience management for business and third sector organisations.	SDS CEAP (2020): Demand for higher-level skills in business and commercial management to respond to changing markets	Frantzeskaki et al (2020): need for skills to foster collaboration across silos and a need for contextual analytical skills relevant to urban planning
Information	Decision support tools, communication tools, data acquisition efforts, digital databases, remote communication technologies	-IT jobs linked to data management and communication; -community engagement on risk and adaptation.		
Physical infrastructure	Climate-resilient buildings, reservoirs for water storage, irrigation systems, canal infrastructure, sea walls	-retrofitting buildings to enhance resilience to extreme events (windproofing, rainwater protection, cooling); -skills for enhancing resilience of new-build construction (new techniques for roofing, integrating green infrastructure elements etc); -inspection and maintenance of built environment; -professional level jobs in planning, design, surveying and management; -flood prevention infrastructure;	Skills Development Scotland CEAP (2020): anticipated increased demand for professional level skills for jobs in planning, design, surveying and management and the deployment of nature-based solutions. SDS Climate Emergency Action Plan (2020): Co-design and development of a Construction Retrofit national training programme.	SDS CEAP (2020): need to demonstrate competence and recognise adaptability and transferability of skills across the sector, for instance through a 'skills passport' scheme. Ageing workforce with a third of construction workers aged 50+, and an estimated 50,000 construction workers retiring by 2029. NatureScot (2020): for flood risk management, major infrastructure players working at national level can find people with nature-based/ecological expertise, recruiting nationally and redeploying.
Warning or observing systems	Developing, testing and deploying monitoring systems, upgrade weather or hydrometeorological services	-scientific and research jobs for understanding risks and developing warning systems; -IT jobs for data management and communication.		
"Green" infrastructure	Revegetation, afforestation, woodland management, increased landscape cover	-restoration, enhancement and maintenance of urban greenspace, forestry, wetlands and community spaces; -urban ecological planning	Skills Development Scotland Climate Change Strategy (2020): 2024: 18,000 hectares of new woodlands created annually NatureScot Nature-Based Jobs Report (2020):	NatureScot Nature-Based Jobs Report (2020): "It is not possible to separately account for all elements in the NatureScot definition of nature-based activities. In particular, it is not possible to obtain specific data on nature-based solutions, environmental green

			peatland/woodland restoration; management of invasive species; planning, ecological engineering.	finance or urban green infrastructure activities." NatureScot (2020): how to stop losing skilled people to commercial forestry?
Financing	Insurance schemes, microfinance, contingency funds for disasters	-education and training in natural capital approaches; -financial management and monitoring; -fundraising and ensuring financial sustainability	Skills Development Scotland Climate Emergency Action Plan (2020): Ensure that natural capital and circular economy considerations are recognised as core skills across all disciplines. NatureScot Nature-Based Jobs Report (2020): existing finance sectors can adapt quickly?	NatureScot Nature-Based Jobs Report (2020): need for understanding of natural capital (and monitoring/ management skills) within finance industry.
Technology	Technologies to improve water use or water access, solar energy capacity, biogas, water purification, solar salt production		Skills Development Scotland CEAP (2020): Increased need for design, analytical and technical skills in new manufacturing processes (eco-design).	Skills Development Scotland CEAP (2020): Current skills shortages of engineers

Table 1: application of typology of adaptation jobs to Clyde Corridor and Glasgow City Region context

4.1 Nature-based solutions to reduce climate impacts

4.1.1 Jobs and skills

- peatland restoration: need field experience as well as academic qualifications; also skills in administrating/monitoring/reporting;
- woodland restoration: financing (especially as sector often charitable or public sector-funded); stakeholder engagement and cross-sectoral working;
- management of invasive non-native species;
- blue carbon;
- flood risk management;
- green finance; understanding of natural capital plus monitoring and management skills;
- planning;
- ecological engineering: natural capital approaches (all NatureScot, 2020);
- importance of skills in maintenance and stewardship of nature-based approaches, as well as initial implementation (Shimizu et al., 2016)
- higher-level skills in business and commercial management to respond to changing markets (Skills Development Scotland, 2020).

4.1.2 Opportunities and challenges

- sector predominantly made up of microbusinesses, with fewer formal qualification pathways and upskilling opportunities (Skills Development Scotland, 2020). Smaller enterprises may also struggle to recruit and retain staff against major infrastructure players (NatureScot, 2020);
- need for retraining and upskilling workforce, and to refresh careers information and pathways into sector to counter ageing workforce (Skills Development Scotland, 2020);
- challenge in creating paid jobs from conservation and restoration sectors that often rely on volunteer labour (NatureScot, 2020);
- risk of losing skilled workers to more lucrative sectors such as commercial forestry (NatureScot, 2020);
- in public sector, austerity and budget cuts mean local governments are likely to have lost people with skills in areas such as ecology (NatureScot, 2020);

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- jobs in sectors such as natural capital accounting are likely to be highly skilled, i.e. Masters or PhD level, and in sectors such as financing existing staff may simply adapt or re-train Moreover, for areas such as flood risk management, major infrastructure players can recruit qualified and skilled labour nationally and re-deploy (NatureScot, 2020);
- importance of ensuring higher education remains up-to-date with ecological planning and natural capital approaches (NatureScot, 2020);
- 2023: Regional Land Use Frameworks developed (Skills Development Scotland Climate Change Strategy, 2020);
- 2024: 18,000 hectares of new woodlands created annually (Skills Development Scotland Climate Change Strategy, 2020);
- 2030: At least 250,000 hectares of peatland restored (Skills Development Scotland Climate Change Strategy, 2020).

5 EMPLOYMENT TRENDS IN THE CLYDE CORRIDOR

5.1 Labour market trends

The Green Alliance's report into Levelling Up Through Nature (Green Alliance, 2021) identifies the centre and west of Glasgow as experiencing very high labour market challenges post-pandemic; and the south of Glasgow and Clydebank as experiencing high labour market challenges post-pandemic. The rest of the Clyde Corridor is rated as facing 'average' labour market challenges, with the exception of Greenock, which faces "low" labour market challenges.

Skills Development Scotland's 2021 Regional Skills Assessments for the Glasgow College Region and the West provide a fuller and useful basis for understanding employment trends in the Clyde Corridor and their relation to adaptation and resilience-related jobs.

In the Glasgow College Region (Glasgow, City, East Dunbartonshire and East Renfrewshire), trends with relevance to adaptation and resilience include short- to mid-term declines projected in jobs in electricity, steam, gas and air conditioning supply (-300 by 2031); in financial and insurance (-900 by 2031); and in manufacturing (-3,300 by 2031), albeit with some replacement demand; plus short- to mid-term growth in professional and in construction jobs over the same time period, e.g. +500 in skilled construction, + 900 in science and technology professionals.

Glasgow College region also has Modern Apprenticeship redundancies above the Scottish average (291.4% from 2019-20 to 2020-21, compared to 135.2% over Scotland as a whole), mostly in construction but also in engineering and energy. Nearly half (48%) of the skills requirement for job openings up to 2031 is for people with higher education level qualifications at SCQF 7-10 (i.e. HNC/Modern Apprenticeship up to Degree level) (Skills Development Scotland, 2021a).

Key points to note for the upper Clyde Corridor (i.e. Glasgow City) hence include:

- Potential for current manufacturing jobs to transition to construction or nature-based jobs for adaptation and resilience;
- Potential for declines in utilities and ventilation sectors, plus growth in skilled construction, to support retrofit of buildings to enhance resilience to extreme events;
- Possibility for decline in financial and insurance jobs, coupled with growth in professional positions, to support deployment of adaptation and resilience via financing, natural capital approaches, and management?
- Importance of supporting younger/less qualified workforce in attaining qualifications which can support skills for adaptation and resilience, especially in sectors such as construction with Modern Apprenice workforce and growth projections.

In the West Region (Inverclyde, Renfrewshire, West Dunbartonshire, East Renfrewshire), trends with relevance to adaptation and resilience include short- to mid-term declines in manufacturing (-1,900 by 2031) and financial and insurance (-100 by 2031); plus short- to mid-term growth in professional, scientific and technical (+600 by 2031) and construction jobs (+300 by 2031); especially change in science and technology

professional positions (+200 by 2031). However, there is no growth in some other sectors relevant to adaptation and resilience e.g. skilled construction and building trades. The region is projected to have replacement demand (i.e. jobs to replace those leaving the sector) for agriculture, forestry and fishing (+300 jobs by 2031); also large replacement demand for construction (300 expansion jobs by 2031, plus 2,400 replacement jobs).

For the West Region, Modern Apprenticeship redundancies are well above Scottish average (363.2% from 2019-20 to 2020-21, compared to 135.2% over Scotland as a whole), mostly in construction but also some in engineering and energy. 46% of the skills requirement for job openings up to 2031 is for people with higher education level qualifications at SCQF 7-10 (i.e. HNC/Modern Apprenticeship up to Degree level) (Skills Development Scotland, 2021b).

Key points to note for the lower Clyde Corridor (e.g. downstream coastal areas) hence include:

- Potential for current manufacturing jobs to transition to construction or nature-based jobs for adaptation and resilience;
- Replacement demand for agriculture/forestry and construction may give an opportunity to upskill replacement workforce with capabilities in nature-based solutions and in construction/retrofitting for adaptation and resilience;
- Some limited possibility for decline in financial and insurance jobs, coupled with growth in professional positions, to support deployment of adaptation and resilience via financing, natural capital approaches, and management?
- Importance of supporting younger/less qualified workforce in attaining qualifications which can support skills for adaptation and resilience, especially in sectors such as agriculture/forestry and construction with significant replacement labour requirement projections.

5.2 Existing training and upskilling opportunities in the Clyde Corridor

The Green Jobs Taskforce's (2021) Recommendation 10 is to "map, review and enhance other training pathways […] to ensure they support a diverse, inclusive and net zero-aligned workforce across the UK". To undertake this exercise for the Clyde Corridor in the context of adaptation and resilience jobs, a reviewer was undertaken of the qualifications provided by further- and higher education institutions in the Clyde Corridor which may offer upskilling or retraining for adaptation and resilience-related jobs.

Construction and civil engineering qualifications appear to be well-represented across all levels. However, given the need to integrate future climate projections into present design (Shi and Moser, 2021) and for current buildings to need to be resilient to more extreme events in future (Stewart and Deng, 2015; Grynning et al, 2020), it is vital to ensure that adaptation and resilience content is embedded within curricula in the present – ideally with a specific focus on the conditions likely to be faced in the Clyde Corridor. It is notable that only a small number of institutions offer qualifications relating to landscape management or urban ecology. Given the prominence of nature-based solutions in both the Glasgow City Region Adaptation Strategy and the Glasgow City Open Space Strategy, the limited number of opportunities for building skills in implementation and stewardship (Shimizu et al, 2016) of natural and semi-natural spaces (especially at vocational and further education level) may require attention. It is also notable that at under- and postgraduate level, the Clyde Corridor's higher education institutions offer a breadth of cross-cutting qualifications relevant to the societal dimensions of adaptation and resilience. This could, however, be supplemented with more vocational qualifications in areas such as community development.

6 KEY ISSUES, LIMITATIONS AND FUTURE RESEARCH REQUIREMENTS

A critical challenge raised across several of the policy documents reviewed for this study (e.g. Skills Development Scotland Climate Emergency Skills Action Plan; Green Alliance Levelling Up Through Nature Policy Insight) concerns getting younger people into the workforce for the sectors that are likely to be critical to adaptation and resilience. The Skills Development Scotland regional audits for Glasgow and West note a particular need for workforce replacement in the construction, heating/ventilation and agriculture/land sectors. Recruiting replacements with the skills to implement adaptation actions may necessitate changing perceptions of sectors such as construction and nature-based jobs (Skills Development Scotland, 2020).

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There is also a related issue around providing adaptation and resilience-related jobs which bring skilled employment for sections of the population who may struggle to find work (Brocklehurst et al., 2021). Existing research appears to have good awareness of the professional (i.e. degree) level jobs associated with planning and management for adaptation and resilience, whereas evidence on vocational skills and qualifications for sectors such as construction and nature-based adaptation is more limited. There may be particular need to build understanding of the potential for adaptation- and resilience-related jobs in urban areas that are suitable for those with vocational or applied qualifications, in addition to degree-level jobs in urban areas linked to adaptation, which are perhaps already better understood.

Another key challenge is ensuring there is a coordinated central source of data on the labour force, skills, and adaptation/resilience job requirements for the Clyde Corridor and wider Glasgow City Region. NatureScot (2020), in their comprehensive report on nature-based jobs and skills, note that it is not possible to obtain specific data on jobs and skills relating to nature-based solutions, urban green infrastructure and environmental green finance. Whilst Skills Development Scotland and Scottish Government Statistics provide a breadth of data on neighbourhood deprivation, labour force statistics and skills, less well represented are some of the jobs and skills requirements from private sector developers. Further research and enquiry may therefore wish to work with local authorities and private sector developers to quantitatively estimate the size of the jobs opportunity for adaptation-related actions in sectors such as construction, civil engineering and land management over the coming decades, and to break down the distribution of these jobs spatially. Data of this nature will help to provide a fuller picture of how closely the adaptation and resilience jobs opportunity in the Clyde Corridor maps onto locations which may stand to benefit.

7 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are drawn for developing adaptation and resilience-related green jobs along the Clyde Corridor:

- The construction, civil engineering and land-based sectors are likely to be the main sources of adaptation and resilience-related jobs in the Clyde Corridor, along with cross-cutting positions linked to supporting societal interventions for adaptation and resilience-building;
- Communities in the east and west of Glasgow, as well as in West Dunbartonshire and Inverclyde, may benefit from targeted programmes aimed at upskilling or retraining workers to meet employment needs in the construction and nature-based adaptation sectors in particular. Data suggests these areas face high employment deprivation, as well as an above average proportion of either low-qualified adults or highly-qualified adults who are out of work. Particular job requirements may include retrofitting and enhanced maintenance/inspection of the built environment, as well as implementation and long-term stewardship of nature-based solutions;
- Projected labour declines in manufacturing and utility supply may provide a skilled workforce, or a workforce willing to undertake retraining, to meet skills and labour replacement requirements in construction and land sectors along the Clyde Corridor. However, ‘skills passports’ for more experienced workers and messaging/engagement to shift perceptions of construction/land sectors among younger workers may be required to maximise this potential;
- There already appears to be good awareness of the types of adaptation and resilience-related jobs in the Clyde Corridor that are open to those with degree-level qualifications. However, there may be need for greater empirical evidence, and also greater engagement with workers and trade unions, on the adaptation and resilience job opportunities that are open to workers with vocational qualifications in urban areas;
- Further- and higher education institutions along the Clyde Corridor offer qualification pathways to meet skills and training requirements for adaptation. However, it is imperative to ensure curricula embed adaptation requirements now in order to provide a skilled workforce for the near future. Further education/vocational training provision also ought to be enhanced for landscape and ecology and for community development sectors to support implementation in practice.

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