GALLOWAY AND SOUTHERN AYRSHIRE BIOSPHERE

STATE OF THE BIOSPHERE

GALLOWAY AND SOUTHERN AYRSHIRE UNESCO BIOSPHERE 2012-2022

ACKNOWLEDGEMENTS

On behalf of the Partnership Board and the Biosphere Team, it is with enormous pride that we share this State of the Biosphere report which is delivered as part of the UNESCO Periodic Review and 10 year anniversary of the Galloway and Southern Ayrshire Biosphere designation.

I would like to give thanks to the Members who have been part of the Partnership Board over the past 10 years, particularly for their time, dedication and expertise to establish and grow the Biosphere to what is has become today. I would particularly like to thank a small tenacious group of individuals who have worked tirelessly over the past months to deliver this report and the periodic review. From the Biosphere Leadership Team; Ed Forrest (Director) and Marie McNulty (Deputy Manager & Business Development Lead Officer) and Partnership Board Members; Joan Mitchell (former Chair), John Thomson (Vice Chair) and Patrick Wiggins.

The level of detail in this report alongside the calibre and experience of specialisms covered by our team is, as ever, growing and impressive. I am confident that with the support we have received over the past 10 years from our valued funders, partners and stakeholders we have an exciting and positive foundation from which to springboard into the next decade of our journey. The State of the Biosphere Report provides us with an important appraisal of our Biosphere as it currently stands today and is a snapshot in time which is both a record and benchmark for future generations to reflect on and learn from.

Melanie Allen

Chair Galloway and Southern Ayrshire UNESCO Biosphere

July 2022

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ACRONYMS

BOB project	Building the Biosphere Project
FLS	Forestry and Land Scotland
FTE	Full Time Equivalent
GSA Biosphere	The Galloway and Southern Ayrshire Biosphere
GVA	Gross Value Added
Ha	Hectare (10,000m2)
LBAP	Local Biodiversity Action Plans
LNR	Local Nature Reserve
MAB Programme	Man and the Biosphere Programme
NNR	National Nature Reserve
ONS	Office of National Statistics
PLACE	People Landscape Arts Culture Environment project
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCIO	Scottish Charitable Incorporated Organisation
SEPA	Scottish Environment Protection Agency
SF	Scottish Forestry
SNH	Scottish Natural Heritage (rebranded NatureScot)
SPA	Special Protection Area
SOSE	South of Scotland Enterprise
SSSI	Site of Special Scientific Interest
tCO2e	Tonnes of Carbon Dioxide equivalent
UNESCO	United Nations Educational Scientific and Cultural Organisation
UWS	University of the West of Scotland

FOREWORD

Biospheres are proving an ideal tool for the meeting of the natural and human environments for the mutual and joint benefit of both. This has been the case in south west Scotland through the work of the Galloway and Southern Ayrshire Biosphere (GSAB) team over the last decade. What has been achieved is quite astounding given the extremely limited resources available until recently. As the State of the Biosphere report makes clear, the level of knowledge and understanding of the issues in the area and the partnerships needed to take matters forward and bring beneficial results is first class. It makes this biosphere an exemplar of innovative practice internationally. And what needs to be done and can be done by or facilitated by the GSAB in the future is abundantly clear in the strategy and forward plans.

Notable highlights showing initiative and innovation during the first decade of operation are many.

The accumulation of objective knowledge about the natural characteristics and assets of the area has provided a firm base for action. A good example is the pioneering work on ecological restoration of peatlands – a priority habitat under the EU Natura programme and now adopted in the UK post Brexit. Another is the Natural Heritage Management Plans enabling stakeholders to concentrate on those habitats requiring most attention to achieve favourable ecological condition. That knowledge is now widely available to anyone in the area and beyond to use in the improvement of the management and care of nature. In addition, bringing together objective information and keeping it updated has allowed the GSAB team to provide an overview of the area, which was previously lacking, and allows it and its partners to plan action more effectively than ever before.

Even more important has been the continuing engagement with the wide range of stakeholders in the area. The governance structure adopted is purposely independent of government so that its membership can reflect all of the communities of interest. The main decision-making body, the Partnership Board, comprises members who largely live and work within the area and are committed to implementing the clearly stated mission, aims and objectives. Due process is assured by a smaller group of Partnership Board members who act as Trustees.

Engagement, communication and partnership work with stakeholders has been a guiding theme throughout the decade. There are many examples of GSAB leadership. The designation of 7 Biosphere Communities following extensive consultation with community leadership groups has been achieved giving a sense of pride in those communities, reflected in the signboards at the gateway to each community. It is aided by the Sense of Place Toolkit developed by the GSAB team. Working with local businesses has been a focus of attention, with the development of tools to help businesses improve their skills and to be better able to respond to marketing opportunities. The Biosphere Certification Mark is one of the outcomes awarded to 37 companies recognising the value added to the area through the goods and services they produce. GSAB also took the lead, for example, in developing Scotland's UNESCO Trail.

Other effective partnerships to meet the GSAB's mission have been established. The Learning Partnerships with Further Education Institutions in Ayrshire helps to progress sustainable development education. Biosphere Footsteps helps in increase carbon literacy. The Proud Supporters

of the Biosphere now has over 200 businesses, over 70 organisations, 15 community representative groups, 7 schools and colleges and over 100 individuals. That is outstanding progress.

The three-fold zonation adopted is a classic example of how biosphere reserves work in practice – a core upland area with a protective buffer and an outer much larger transition zone where most of the c95,000 residents live. There is a good understanding of value of this in the planning and implementation of the work programmes. It has proved a practical tool for enhancing understanding of how sustainable development can be achieved through human communities living in harmony with their natural surroundings. The adoption of the Ecosystem Services Approach has been a game changer enabling all interests to recognise their contribution and therefore bringing a significant improvement in the link between the natural world and its human use. And the Climate Ready Biosphere dossier is an exemplary aid tool for partners to change their approach.

Leading stakeholder dialogue on the future of land use has been a major step forward for the area that would not have happened without the existence of the biosphere and the initiative of the GSAB team. This is a somewhat vexed topic in the area for two primary reasons. The substantial changes in or threats to the landscape, biodiversity and communities of the area due to commercial afforestation, agricultural intensification and wind turbine developments are discordant with the traditional land use of the area and fail to address the current challenges of climate and nature emergencies in a balanced and even-handed way that the GSAB recommends. Secondly, the lack of adequate consultation with local communities and consideration of their views in the decision-making process related to such changes goes against the participatory objectives of the Biosphere

The achievements are cogently set out in this State of the Biosphere report. What a most impressive result, especially given the limited resources of the team. There is now a greater coherence to the area and more collaborative working between different sector interests not previously existing, looking forward to addressing the key issues identified through stakeholder consultation and also those of global concern that have local implications. As a result, I have no doubt from my personal local knowledge and my international experience gained through IUCN's World Commission on Protected Areas over 25 years that the Galloway and Southern Ayrshire Biosphere Reserve has fully achieved the requirements set by UNESCO for its re-designation for the next decade. Indeed, it has gained exemplar status in Scotland, and is well regarded elsewhere in the UK biosphere family and is an active and formative participant in the international biosphere community.

ROGER CROFTS

IUCN World Commission on Protected Areas Emeritus, Chair Galloway and Southern Ayrshire UNESCO Biosphere 2010-2013

EXECUTIVE SUMMARY

This State of the Biosphere report has been produced alongside the first Periodic Review for the Galloway and Southern Ayrshire UNESCO Biosphere (the GSA Biosphere), a requirement of all World Biosphere Reserves every ten years under the Statutory Framework for the World Network of Biosphere Reserves. The aim of the periodic review is to improve the quality of Biosphere Reserves and their work as sites for demonstrating approaches to sustainable development.

This report highlights the many positive achievements of the Galloway and Southern Ayrshire Biosphere over the last 10 years and presents an analysis of the environmental, economic, and societal perspective based on available data, collation of published information and stakeholder perspectives. The local stakeholder input was sought through workshops, community sessions and online e-surveys.

2022 represents 10 years since the GSA Biosphere was officially designated by UNESCO as a Biosphere Reserve. The GSA Biosphere is centred on the Galloway Hills where nationally and internationally designated sites for nature conservation such as Silver Flowe, Cairnsmore National Nature Reserve and Merrick Kells are located and covers an area of 5,268km2.

The early years for the Biosphere were dependent on short term project funding beginning before the official designation was confirmed with The Building Opportunity in the Biosphere (BOB) project. The project ran from April 2011 to March 2013 and was responsible for the initial work undertaken by the Biosphere. During the 2013 to 2014 financial year the GSA Biosphere did not receive any funding and had no permanent staff members employed. The Next Steps Project 2014 – 2017 was brought together through a three-year partnership agreement with a range of partners. This enabled the Biosphere to employ a core team of 3 FTE officers with some finance and administrative support. Following this a new funding package for 1.5 FTE and administrative support was secured from Local Authority partners for the period 2017- 2022, which despite the lower staffing ensured the Biosphere could continue to grow and develop new initiatives.

Thanks to the work put in by the officers and Biosphere Board members, in the development of a new business case, the GSA Biosphere was able to secure core funding from the South of Scotland Enterprise (SOSE) in December 2020. SOSE announced that it would provide the GSA Biosphere with £1.9 million of funding over the following five years, enabling the Biosphere Partnership to expand the number of full-time staff.

Throughout the last ten years the GSA Biosphere has continued to work closely with its partners to foster strategic partnerships. In recent times the GSA Biosphere has played a key role with our local authority partners and other stakeholders in the development of Galloway Glens and Coalfield Communities Landscape Partnership Schemes, worth £5m and £6m respectively.

The Biosphere designation is focused on community engagement and empowerment with local communities. The communities within the GSA Biosphere have seen a number of significant changes over the last ten years that have led to increased challenges. In the northeast of the Biosphere the decline in heavy industry and especially coal mining, that started in the 1980s, has continued over the last 10 years, with employment in open cast mining in particular declining significantly. In other areas financial 'austerity' has led to a reduction in public sector jobs, with many residents having to travel significant distances to work. As in much of rural Scotland, factors including poor transport links make isolation an important issue for people living in rural parts of the Biosphere.

The GSA Biosphere has helped communities and stakeholders meet these challenges by providing resources such as marketing tools that celebrate the rural attractions of the Biosphere, the upskilling of business owners, particularly in tourism, on how to use the UNESCO designation to attract new business, and the development of the Biosphere Communities initiative. The reduction in local authority budgets through austerity measures, throughout the 10-year review has increased the importance of the work done by the GSA Biosphere and its partners in supporting local communities.

A high proportion of employment is in the land-based sectors with 8% of all adults employed in relevant primary industries. The key economic sectors include forestry, agriculture, tourism and energy production. Historic sectors such as mining and quarrying are far smaller but have left a large mark on the economic landscape of villages and towns in the Biosphere. There are comparatively few well-paid jobs in the traditional professions and indeed the region has experienced some difficulty in filling some of those that do exist.

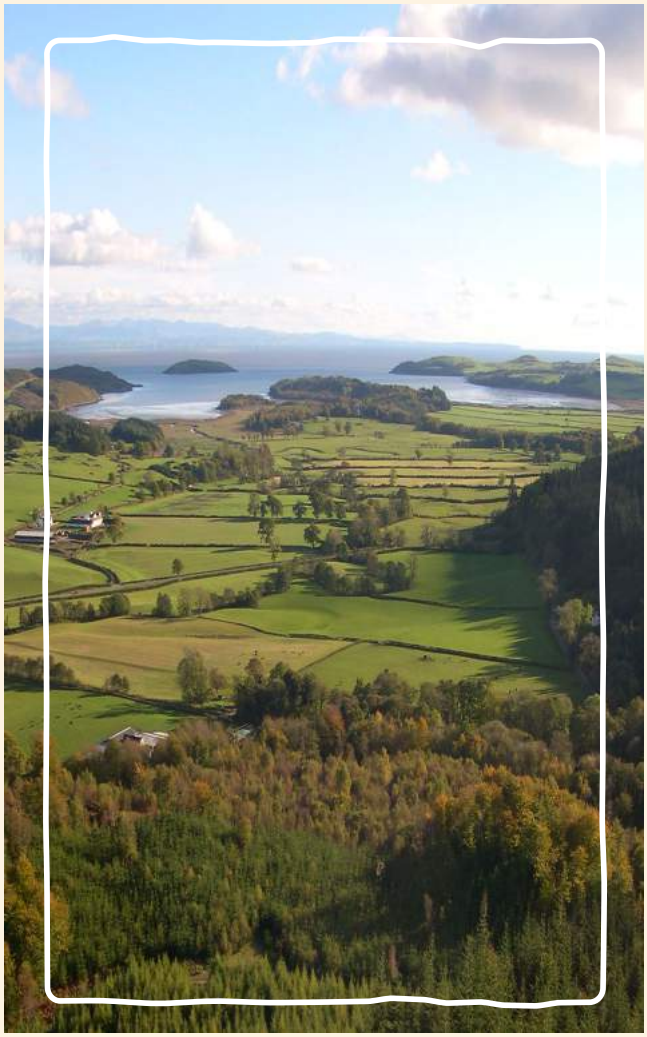
The economy within the GSA Biosphere has seen several notable changes over the last 10 years during the GSA Biosphere's operation. Set against the decline in employment in historically crucial sectors such as agriculture and mining, have been more positive trends such as the growing scope for remote working in a wide range of knowledge-based enterprises and expanding markets for sustainably produced goods and immersive environmentally-based experiences. The Covid 19 pandemic has reinforced many of these pre-existing shifts in lifestyle, taste and attitude.

As a result of its previous initiatives the GSA Biosphere has been well-placed to capitalise on the opportunities created, not least in the realm of more responsible and sustainable tourism and of adding value locally to the wealth of produce that in recent years has all too often been dispatched untreated for processing elsewhere.

The geography of the terrestrial area ranges from the remote uplands of the Galloway Hills with its myriad of lochs and bogs, through farmland and forests to the cliff tops, estuaries and beaches of the coast. The wealth of natural habitats is recognised by the many designated sites that can be found across the extent of the GSA Biosphere and the number of species of importance present.

The quality and variety of the Biosphere's different habitats is one of the features most commonly mentioned by stakeholders when questioned over the attractions of the Biosphere. The Biosphere has worked during the previous ten years to lead the way in protection and enhancement of the natural environment, to ensure that it can continue to provide inspiration to future generations. Core to this objective is re-establishing a benign and harmonious relationship between people and nature by developing, advocating, and supporting initiatives that promote and celebrate more sustainable and better integrated land use.

The land cover within the GSA Biosphere is currently witnessing a series of changes due to a combination of human and climate change factors. The vegetation that has resulted from traditional low intensity agriculture, such as permanent pasture and upland heathland, is being replaced by that associated with land management types such as intensive dairy farming and coniferous plantations. This economically driven transition, in combination with a changing climate, is leading to a reduction in the extent of the types of land cover previously characteristic of the area, in the wildlife that these supported and in the wider environmental benefits that they provided.

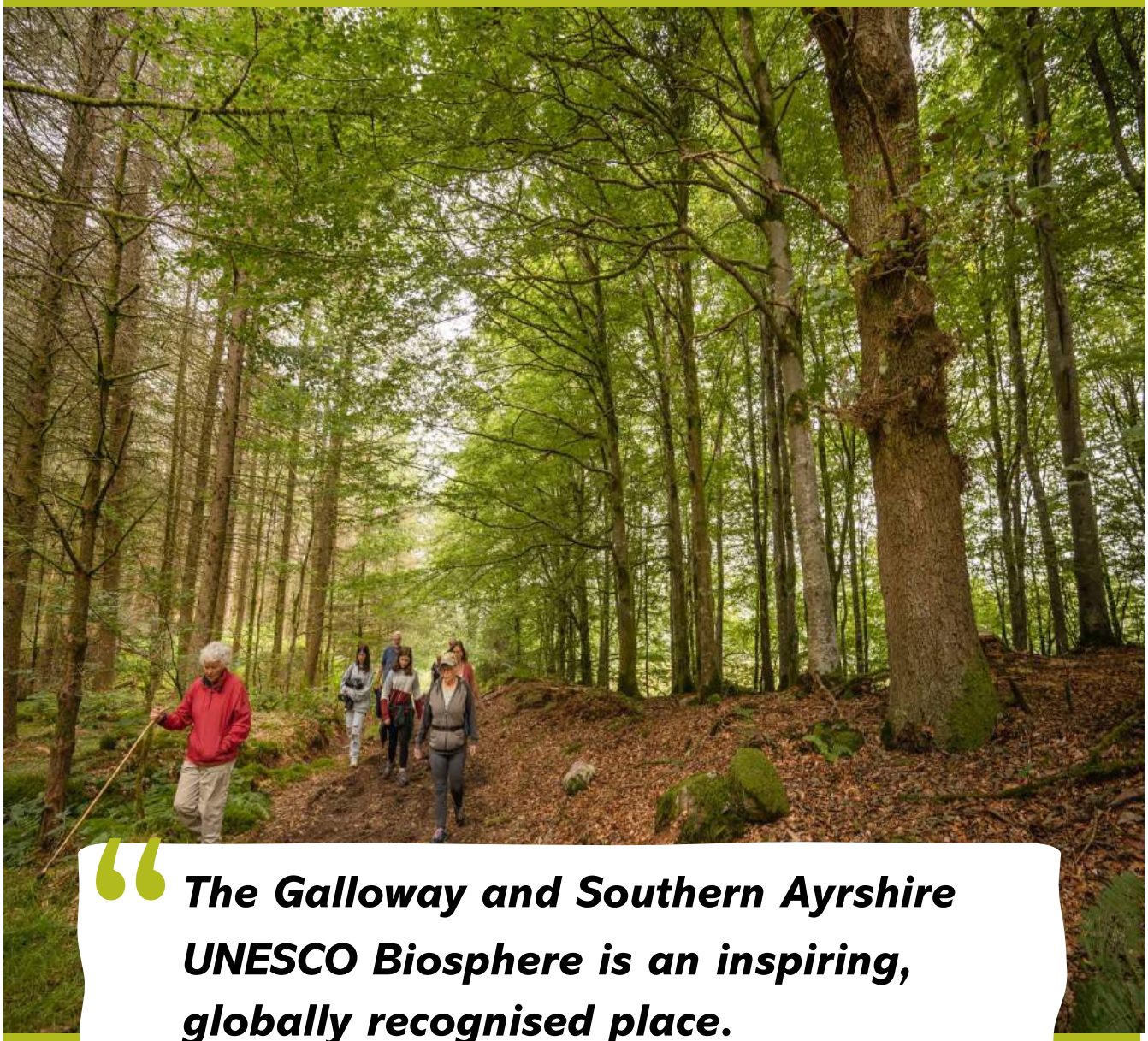


New coniferous plantations are more widespread and extensive than new woodlands of broadleaved or other native species, with 85% of all new woodland within the GSA biosphere being recorded as coniferous. This increase is driven by the increased demand for established varieties of construction timber and by incentives focused on speedy carbon sequestration. Its overall impact is to skew the composition and management of woodland within the Biosphere towards a monoculture.

The other major driver of land use change within the Biosphere is the intensification of lowland farming, particularly in the livestock sector and dairying. Southwest Scotland, including the area covered by the GSA Biosphere, has always been a stronghold of cattle rearing but recent years have brought an increased focus on large-scale dairy farming, much of it involving year-round indoor housing. As a result, Dumfries and Galloway alone now holds close to 50% of all the dairy cattle in the whole of Scotland. The impacts on the environmental quality of the land affected have been far-reaching and range from those on soil structure and water quality to those on farmland bird populations and landscape features.

The Biosphere Partnership has supported discussion and research into how these pressures can be better guided and managed with the aim of ensuring that what may be advantageous and sometimes inevitable changes in use and practice in one sector do not come at unacceptable cost to other interests and activities. The ultimate goal is a better integrated and more sustainable approach to future land use that brings long-term benefits to the environment, local communities, and the local economy. The Partnership has encouraged exchanges and sharing of experiences, information and good practice through learning and networking opportunities with a variety of different stakeholders.

OVERVIEW



The Galloway and Southern Ayrshire UNESCO Biosphere is an inspiring, globally recognised place.

James Bridge, Secretary-General of the UK National Commission for UNESCO

UNESCO WORLD BIOSPHERES

A Biosphere is a special designation awarded by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) under the Man and the Biosphere (MAB) Programme. First developed in the 1970's the original MAB programme was focussed on conservation and research of a range of ecosystems. In 1995 following the Seville Strategy this was broadened out to include sustainable development actively seeking to relate directly to communities and businesses. Today the MAB Programme promotes activities for sustainable use and conservation of biological diversity and for the improvement of the relationship between people and their environment globally.

Biospheres are areas of terrestrial and coastal or marine ecosystems, or a combination thereof, that are recognised internationally within the MAB Programme. Biospheres are nominated by national governments and remain under their jurisdiction.

UNESCO Biospheres are designated to inspire communities to work together in creating a future we can all be proud of, connecting people with nature and cultural heritage, while strengthening the local economy. They must fulfil three aims:

- **Conservation –** protecting wildlife, habitats, and the environment.
- **Development –** encouraging a sustainable economy and community.
- **Logistic support –** environmental education and sustainable development education and training, research, and monitoring.

Biospheres have three interrelated zones that aim to fulfil the three functions (conservation, development, logistic support):

- **The core area(s)** comprises a strictly protected ecosystem that contributes to the conservation of landscapes, ecosystems, species, and genetic variation.
- **The buffer zone** surrounds or adjoins the core areas and is used for activities compatible with sound ecological practices that can reinforce scientific research, monitoring, training, and education.
- **The transition area** is the part of the reserve where the greatest activity is allowed, fostering economic and human development that is socio-culturally and ecologically sustainable.

In July 2012 after a lengthy local engagement process involving communities, businesses, local organisations and public sector bodies Galloway and Southern Ayrshire was designated as the first new style UNESCO Biosphere in Scotland.

As part of the designation, Biospheres are expected to carry out a Periodic Review every 10 years and report back to UNESCO. The periodic review enables a reflection of the functioning, zoning, scale of the biosphere as well as the involvement of the populations living on the site.

The periodic review represents an opportunity to carry out a qualitative survey of the actions implemented to date, and their results, for the Galloway and Southern Ayrshire Biosphere (GSA Biosphere). It provides the Biosphere with the time to take stock of progress made over the last 10 years. The GSA Biosphere Periodic Review process:

- Takes stock of the current state of the Biosphere in relation to environmental and socio-economic factors.
- Assesses key environmental, economic, and societal changes over this time period.
- Reviews what the Biosphere has achieved and who has been involved.
- Assesses what the major challenges to the people and the environment within the Biosphere have been.
- Captures stakeholders' views on the priorities for the next 10 years.

APPROACH TO THE PERIODIC REVIEW

The Periodic review process was facilitated by WSP on behalf of The Galloway and Southern Ayrshire Partnership Board (referred to as the Biosphere Partnership Board). The review involved using a combination of desktop research, stakeholder engagement, discussion with the Biosphere Partnership Board and stakeholder workshops. The approach aimed to enable as wide a group of stakeholders as possible to contribute to the review process and provide the Biosphere Partnership Board with the required information to report back to UNESCO and shape their strategy for the next 10 years.

In light of the COVID-19 pandemic, the methods used during the Periodic Review process had to be adjusted to follow the Scottish Government guidance at the time. Digital stakeholder engagement tools such as Microsoft teams and the Miro Whiteboard software were used when face to face workshops were not possible. In addition, an online survey open to the general public was distributed electronically. The COVID-19 pandemic has impacted on access to open-source data, e.g. The 2021 census in Scotland was delayed for 12 months meaning that the only census data available was that gathered in 2011, a year before designation.

Data collation and analysis

A desktop review of relevant published data was conducted to collate key information and relevant datasets for the different aspects covered in the review including economy, education, culture and society, the natural environment and environmental values. Data was used to develop a profile of the existing population and the contribution of the GSA Biosphere to society, environment and the economy and compared to the data gathered in 2012 for the Biosphere's inception. Where feasible, spatial data was gathered to produce informative maps. Details of the sources from the desktop review are provide in Appendix A – Desktop Review Data sources.

Stakeholder engagement

To supplement the desktop review, a stakeholder engagement programme was undertaken to allow stakeholders to input into the review of the Biosphere. Key stakeholders were identified and grouped by themes such as business, land use and education. Partners that had previously worked with the Biosphere board were invited to contribute along with technical experts and community leaders. This included the Biosphere Partnership Board members, local decision makers, government agencies, local councils, local conservation groups, coordinators/ managers, communities and businesses. A series of engagement activities were carried out involving 78 participants. This included;

- Two Initial Workshops with the Biosphere Partnership Board: 01/02/2022 and 03/02/2022, Held online via Microsoft teams, Invitees – the Biosphere Partnership Board.
- Communities Workshop: 01/03/2022, Held online via Microsoft teams, Invitees – Relevant members of Biosphere Partnership Board and key community representatives.
- Land Use Workshop: 02/03/2022, Held online via Microsoft teams, Invitees – Relevant members of Biosphere Partnership Board and key land use/management stakeholders.
- Business Workshop: 02/03/2022, Held online via Microsoft teams, Invitees – Relevant members of Biosphere Partnership Board and key business representatives.
- Strategic Partners Workshop: 09/03/2022, Held on-line via Microsoft teams, Invitees – Relevant members of Biosphere Partnership Board and key partners from government bodies & local authorities.
- Stakeholder Engagement Review Workshop: 25/03/2022, Face to face workshop at the Catstrand New Galloway, Invitees – the Biosphere Partnership Board.
- Biosphere Ecosystem Services Workshop: 25/03/2022, Face to face workshop at the Catstrand New Galloway, Invitees – the Biosphere Partnership Board and relevant stakeholders.

In addition to the specific workshop sessions an online stakeholder engagement survey was published via Microsoft Forms to allow members of the general public to input into the stakeholder engagement process. The survey was launched on 2 February and ran for the length of the review process (10 weeks). In total, 90 responses were received, and the results included within the review process.

THE GALLOWAY AND SOUTHERN AYRSHIRE BIOSPHERE

The Galloway and Southern Ayrshire Biosphere (GSA Biosphere) is one of over 727 global biospheres across 131 countries. It is one of seven across the UK and one of two in Scotland. It was designated by UNESCO in July 2012 and was the first UNESCO Biosphere in Scotland. It covers an area of 5,268km2 (526,800ha) in Southwest Scotland and is home to around 95,000 people. It is recognised globally as a world class environment for people and nature with an array of landscapes, wildlife, cultural heritage and learning opportunities.

The GSA Biosphere is centred on the Galloway Hills where nationally and internationally designated sites for conservation such as Silver Flowe, Cairnsmore National Nature Reserve and Merrick Kells are located. The Biosphere extent is largely based on river catchments radiating out from the designated sites in the Galloway Hills. These often reflect social units, as well as capturing and exemplifying interdependencies between human well-being, land management and water regulation. It is the multiple benefits to society that these interactions can provide when well managed that the Biosphere seeks to demonstrate.

The Boundary of the GSA Biosphere

Zonation

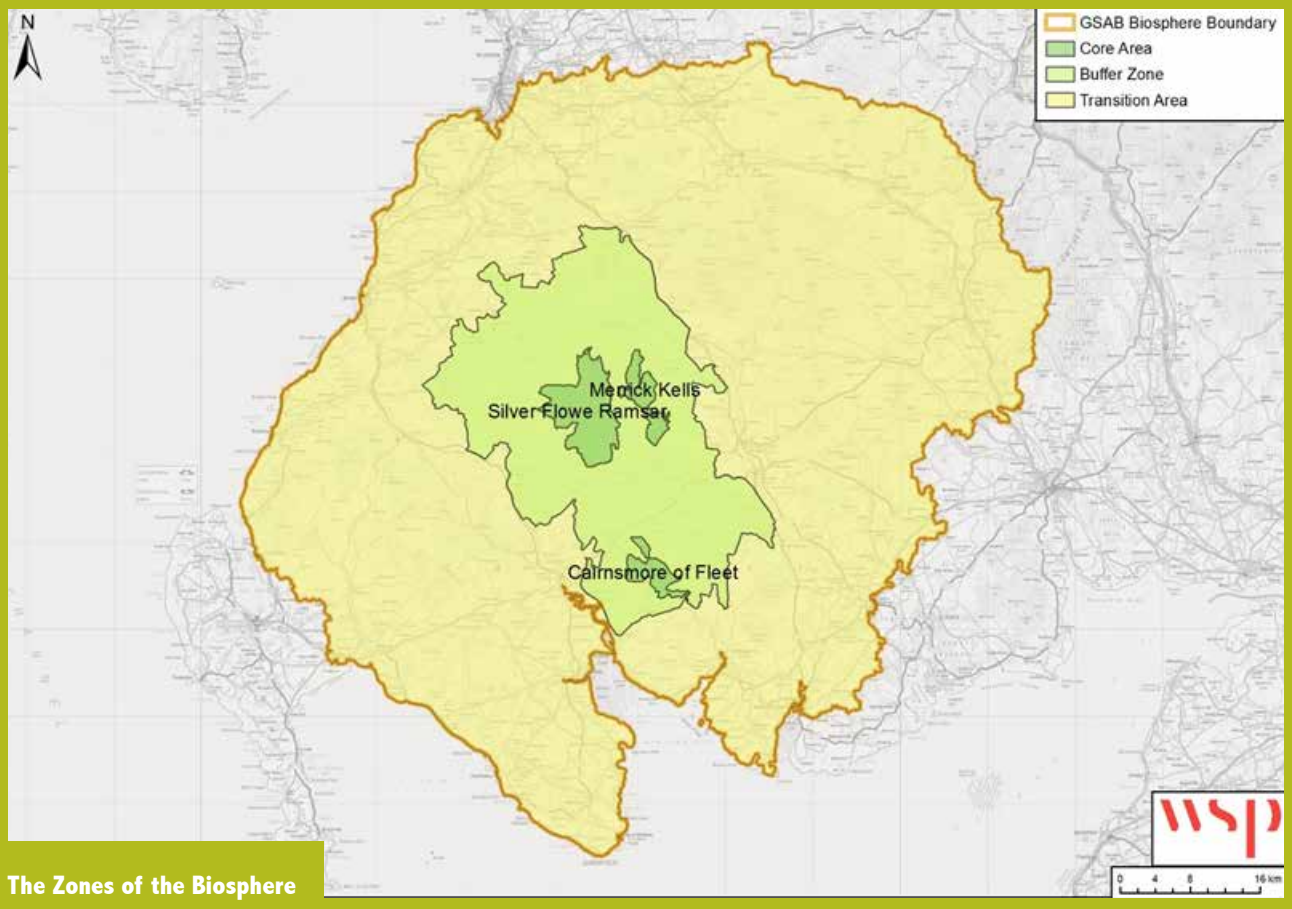
As with all Biospheres, the GSA Biosphere has three zones: a core area, a buffer zone, and a transition area. The extent of the different zones within the GSA Biosphere are shown in the graphic below.

The GSA Biosphere area

Biosphere Zone	Area (ha)
Transition Area	431,707
Buffer Zone	84,523
Core Area	10,658
Combined zones of the Biosphere	**526,800**

The Core of the Biosphere is formed by sites covered by statutory nature conservation designations and comprises the Merrick Kells Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC), Silver Flowe Ramsar site and the Cairnsmore of Fleet SSSI and National Nature Reserve.

The Buffer zone corresponds roughly with the boundary of the Galloway Forest Park, largely owned by Scottish Government and managed by Forestry and Land Scotland (FLS). The transition area is the largest zone and is a mix of moor, forest, farmland, coastline and rural communities. It extends into the wider land of Dumfries and Galloway, South Ayrshire and East Ayrshire. Most of the population of the Biosphere live and work within the transition area where the focus is on sustainable development.



The Zones of the Biosphere

GSA BIOSPHERE STRATEGIC OBJECTIVES AND VISION

The GSA Biosphere's Mission Statement

"The Galloway and Southern Ayrshire Biosphere promotes a balanced relationship between human interaction and the natural environment, through the establishment of effective partnerships, community engagement, innovative projects, research and learning. Ensuring that local communities act collaboratively and responsibly to build thriving sustainable societies in harmony with their natural surroundings."

Aims and objectives

"To demonstrate our passion for living in a way that benefits people and nature".

The aim of GSA Biosphere is to encourage cooperation and collaboration to develop sustainable and innovative solutions and projects to support the natural heritage and rural communities of Southwest Scotland.

The current key strategic aims for the GSA Biosphere are set out in 2017 – 2022 Strategic plan and include:

- Working to pilot and promote strategies and projects focusing on climate adaption and mitigation across the Biosphere
- Promoting and creating opportunities to enhance and protect the region's natural resources, through effective and positive management and engagement
- Networking and knowledge, including research, monitoring and education to support the development of a knowledge base and the mechanisms to share and learn
- Encouraging local communities, businesses and other Biosphere stakeholders to understand and value their natural environment, increase awareness of the Biosphere allowing collaboration in designing and implementing projects that support sustainable development and business growth

Management of the Biosphere

Following its designation in 2012, The Galloway and Southern Ayrshire Biosphere Partnership was established as a Scottish Charitable Incorporated Organisation (SCIO) in 2013.

The Galloway and Southern Ayrshire Biosphere Charter sets out the principles which underpin the Biosphere:

1. Help conserve the natural resources of the Biosphere
2. Support the economy to benefit people and nature
3. Promote cultural heritage & local products
4. Contribute to the health and wellbeing of the community
5. Develop knowledge, understanding and promote research
6. Raise awareness of the Galloway and Southern Ayrshire Biosphere

Throughout its designation the GSA Biosphere has been guided by a Partnership Board whose members are representatives of the businesses, communities and organisations who live and work in Galloway and Southern Ayrshire. The Biosphere Trustees are drawn from the Partnership Board and actively support the Biosphere Staff in the delivery of their duties. The number of staff employed by the Biosphere has varied over the last 10 years due to changes in funding levels but has never been large.

2011 – 2013 The Building Opportunity in the Biosphere (BOB) Project

The work for the GSA Biosphere began before the official designation was confirmed with The Building Opportunity in the Biosphere (BOB) project. The project ran from April 2011 to March 2013 and was responsible for the initial work undertaken by the Biosphere. The project was designed to build awareness and support across the region ensuring that when the designation was confirmed there would be sufficient momentum of support for the opportunities it would bring to ensure that key funding partners would be committed to the continuation of the process. The project was managed by the Southern Uplands Partnership, a charitable body dedicated to promoting sustainable, environmentally based rural development across the south of Scotland and involved two full time officers.

Once the GSA Biosphere was formally designated in July 2012, the interim board moved to become registered as a Scottish Charitable Incorporated Organisation with a formal constitution. Once the GSA Biosphere was constituted in 2013 the Galloway and Southern Ayrshire Partnership Board was formalised, and Joan Mitchell was appointed as the Chair, a position she retained until November 2021.

2013 - 2014

The end of the BOB project resulted in an end to funding. During the 2013 to 2014 financial year the GSA Biosphere did not receive any funding and had no permanent staff members employed. The Biosphere continued to function through the support of volunteer Board members, third sector organisations and key public sector officers. The lack of Biosphere officers during this period meant much of the momentum generated through the BOB project substantially dissipated, with damaging consequences for public interest and confidence.

2014 - 2017: Next Steps

A new funding package called Next Steps was brought together through a three-year partnership agreement including Scottish Natural Heritage, Dumfries and Galloway Council, East Ayrshire Council, South Ayrshire Council and Forest Enterprise Scotland. This enabled the Biosphere to recruit three new positions which were again hosted through the Southern Uplands Partnership. The officers covered three primary areas of focus for the GSA Biosphere: Communities and Learning, Natural Heritage, Business and Development.

2017 – 2022

In 2017 the Biosphere Partnership succeeded in negotiating a new 5-year funding package from the three local authority partners ahead of the Next Steps project coming to an end. The funding was supplemented by support from Scottish Natural Heritage (and then NatureScot) and Forestry Enterprise Scotland (and then Scottish Forestry) which enabled the Biosphere to maintain a core team of 1.5 FTE officers with some finance and administrative support. The GSA Biosphere developed more independence from the Southern Uplands Partnership during this period but continued to work collaboratively with it.

2021 – onwards

Thanks to the work put in by the officers and Biosphere Board members and the development of a new business case, the GSA Biosphere was able to secure funding from the South of Scotland Enterprise (SOSE) in December 2020. SOSE announced that it would provide the GSA Biosphere with £1.9 million of funding over the following five years, enabling the Biosphere Partnership to expand the number of full-time staff and the size of the Partnership Board.

The Biosphere Partnership currently employs nine full time employees across sectors including biodiversity, land use, communities, education, business development and business engagement. This has enabled the GSA Biosphere Partnership to become a fully independent organisation employing its own staff and managing its own finances. In December 2021, Melanie Allen was elected as the new Chair of the Biosphere Partnership Board taking over from Joan Mitchell.

Key strategic partners and initiatives

The Biosphere's nexus of key partners has changed in the course of the 10-year period with changes in the wider institutional landscape and funding arrangements, and as new partners have come on board. The BOB project was supported by a wide group of stakeholders; Scottish Government and the European Community Ayrshire and Dumfries & Galloway LEADER 2007-2013 Programmes; Dumfries and Galloway Council; East Ayrshire Council; South Ayrshire Council; Scottish Natural Heritage; Scottish Forestry; Scottish Environment Protection Agency; Southern Uplands Partnership.

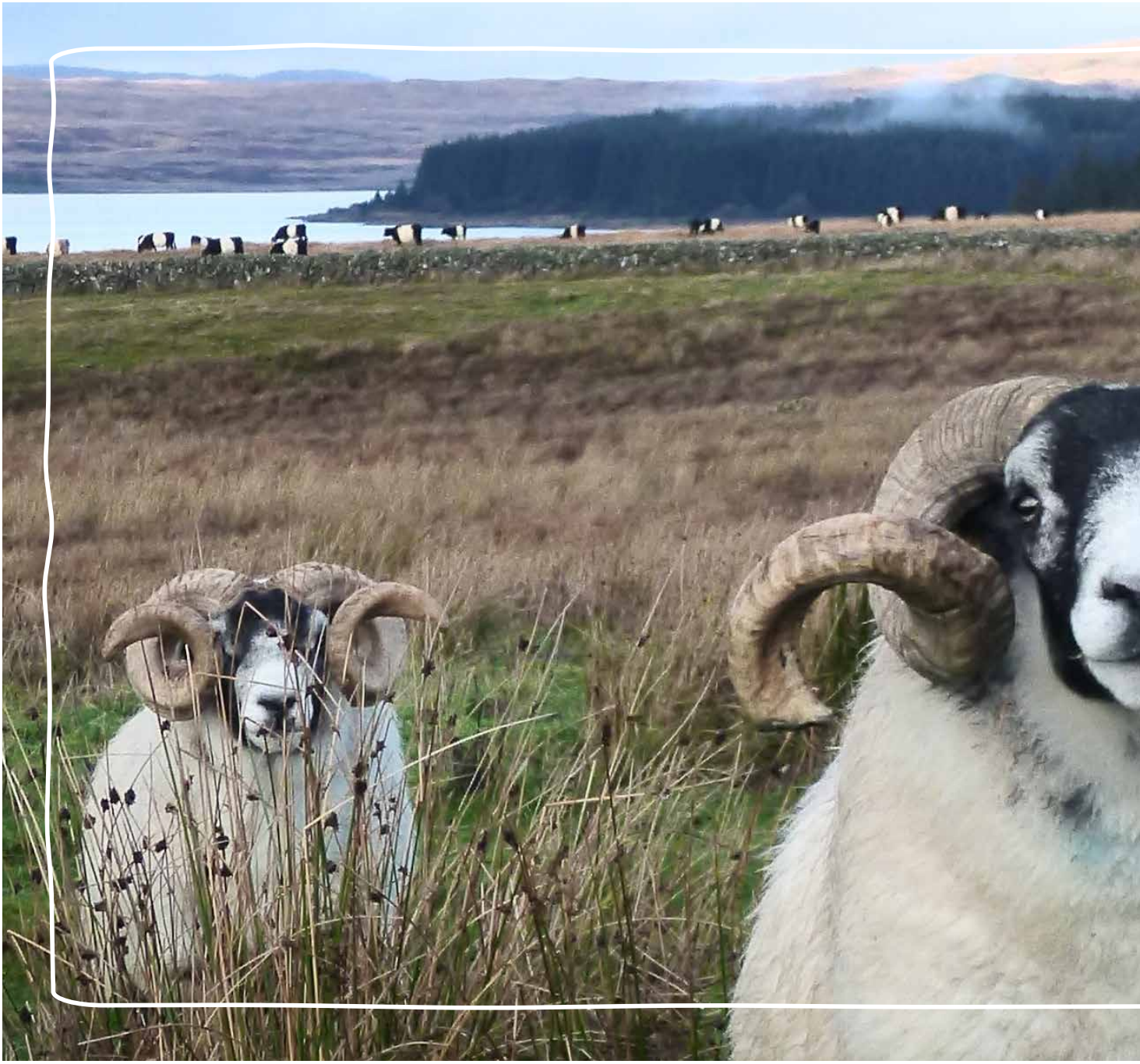
Many of these partners continued to support the Biosphere through its first 10-year period, particularly the three local authorities who provided essential key funding that ensured continuity before the SOSE funding commitment was established. They continue to play a key role in delivery of the Biosphere objectives. Other strategic partners include the South of Scotland Destination Alliance, Visit Southwest Scotland and Visit Scotland, all of whom support the Biosphere to meet its objectives.

In recent years the GSA Biosphere has played a key role with local authority partners and other stakeholders in the development of Galloway Glens and Coalfield Communities Landscape Partnership Schemes worth £5m and £6m respectively. Both projects embody the wider Biospheres ethos and actively deliver again Biosphere objectives, with the Galloway Glens scheme promoting itself as "the Biosphere in action". GSA Biosphere staff sit on the Board of the Galloway Glens Landscape Partnership and help guide and steer delivery of their many individual community-based projects.

Involvement in such schemes has helped the GSA Biosphere develop a reputation as an organisation which is proactive in developing and delivering partnership initiatives. This is reflected in its current role developing and leading on the Blackface Sheep Wool initiative, Borderlands Natural Capital Farm Audits and involvement in facilitating trades associated with Landscape Enterprise Networks.

COMMUNICATIONS AND MEDIA

The GSA Biosphere has had a branding and communications strategy since it was established in 2012, with a review and update taking place in 2021. A Facebook page and Twitter profile was established in 2014 and, this along with the website, has been one of the most frequently used platforms for engagement with stakeholders. In addition to social media the GSA Biosphere has communicated its messages through the Galloway and Southern Ayrshire Biosphere website, e- newsletters, press releases and posters for specific events. In person communication has occurred through pop up exhibition displays and community workshops.



The current Communications and Marketing Plan was devised and adopted in 2021. The Plan is guided by an overall vision for communications activity and identifies different audiences that should be involved within the GSA Biosphere activities. It highlights different communication mediums to be used to engage these varied stakeholders, with methods ranging from formal reporting to social media and print and digital press. Supported by the appointment of a dedicated Marketing and Communications officer, this has led to a significant increase in profile for the GSA Biosphere.

SOCIETY AND COMMUNITIES

People and their relationship with the natural and cultural environment are at the heart of all UNESCO Biospheres.

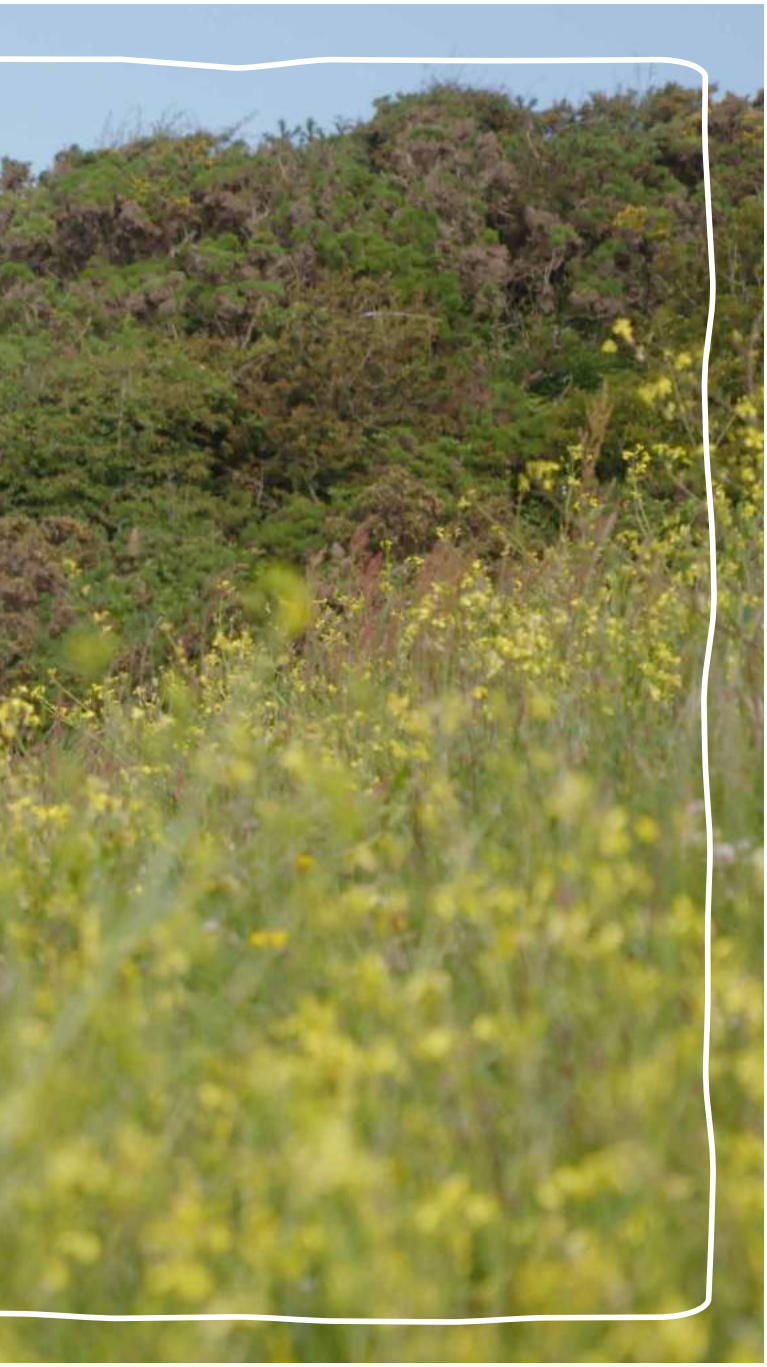
The Biosphere designation is focused on community engagement and empowerment, with the aspiration that local communities identify with the Biosphere's objectives and influence the activities which are delivered through it. Sustainable development is one the GSA Biosphere's key thematic objectives and carries with it a very broad agenda, bringing together aspects such as community wealth building, health and wellbeing and the local economy. This section covers the changes that have occurred within the Biosphere, the current challenges faced, and the work undertaken to support the health and wellbeing of its communities and the local economy.

Even prior to the designation of the GSA Biosphere the benefits that the designation could bring for the health and wellbeing of its residents were identified in a study into the socio-economic potential of the Biosphere carried out in 2008. This focused on the potential increase in sustainable jobs, pride in the local area and improved access to the environment and enjoyment of the outdoors. This benefit to residents' health and wellbeing has remained core to the Biosphere aims and is now aligned with Scottish Governments commitment to becoming a wellbeing economy. This commitment puts building an economy that is inclusive and that promotes sustainability, prosperity and resilience, where businesses can thrive and innovate, at the heart of Scottish government aspirations. It is a commitment that brings national objectives fully into line with the original aims of the GSA Biosphere.

The GSA Biosphere is largely rural and has a population of approximately 95,000 people (with an average population density of 0.18 persons per hectare). It is characterised by a large number of small towns and villages all of which have fewer than 10,000 residents. Outside the Biosphere's boundary, the three larger urban centres of Ayr, Dumfries and Stranraer are of importance because they provide services and employment for many people and communities residing within the Biosphere.

As in much of rural Scotland, factors including poor transport links make isolation an important issue for people living in rural parts of the Biosphere. This can have an impact upon quality-of-life indicators, as well as health and wellbeing outcomes. Furthermore, the sparse population, thinly spread services and unreliable connectivity can further restrict opportunities for employment and skills acquisition and reinforce deprivation.

The GSA Biosphere has seen a number of significant changes over the last ten years that have led to increased challenges for the communities within it. In the northeast of the Biosphere the decline in heavy industry and especially coal mining, that started in the 1980s', has continued over the last 10 years with employment in open cast mining in particular, declining significantly, with coal extractions having ceased altogether within the Biosphere and the rest of Scotland.



In other areas 'austerity' has led to a reduction in public sector jobs, with many residents having to travel significant distances to work. During the consultation process concerns about increasing unemployment and a lack of available jobs were raised by many local communities, who also highlighted a requirement for new "green skills".

The GSA Biosphere has helped some communities and stakeholders meet these challenges by providing resources such as marketing tools that celebrate the rural attractions of the Biosphere, the upskilling of business owners, particularly in tourism, on how to use the UNESCO designation to attract new business, and the development of the Biosphere Communities initiative. This is increasingly important and is discussed further within the economy section of this report.

Feedback during the stakeholder engagement showed a perception that the age profile of the GSA Biosphere is becoming increasingly skewed to the elderly as young people migrate out of the area. This is supported by the population figures reported below. This could be attributed to several factors of which the lack of well-paid professional positions was seen to be one. Many younger people leave the area for further education or a livelier social life and then fail to return. At the same time there is an inward migration of older people, often seeking retirement in a beautiful area who bring with them a demand for services (tradesmen, shops, cafes etc) and contribute widely to supporting local community initiatives.

Concern was expressed in the workshops and online, about the decline in traditional agriculture, particularly upland farming, as older farmers, from long-established farming families, seek retirement and have their farms bought at inflated prices by private forestry companies located outside the area. New entrants to the farming industry are unable to compete with these inflated land prices. This was felt to be eroding the infrastructure needed for agriculture to thrive and driving a wider contraction in the customer base for services and a decline in the traditional cultural activities of rural communities.

The reduction in local authority budgets and associated local authority led initiatives, due to austerity over the 10 year review period has increased the importance of the work done by the GSA Biosphere and its partners in supporting local communities.

POPULATION

Population change

The 2020 population estimate show that the total population of the data zones that make up GSA Biosphere is around 103,000 individuals. The population is therefore estimated to be similar to the 2011 estimate of 95,000 individuals. The gender split between males (51%) and females (49%) within the GSA Biosphere is in line with the ratio for wider Scotland and has remained constant across the 10 year period.

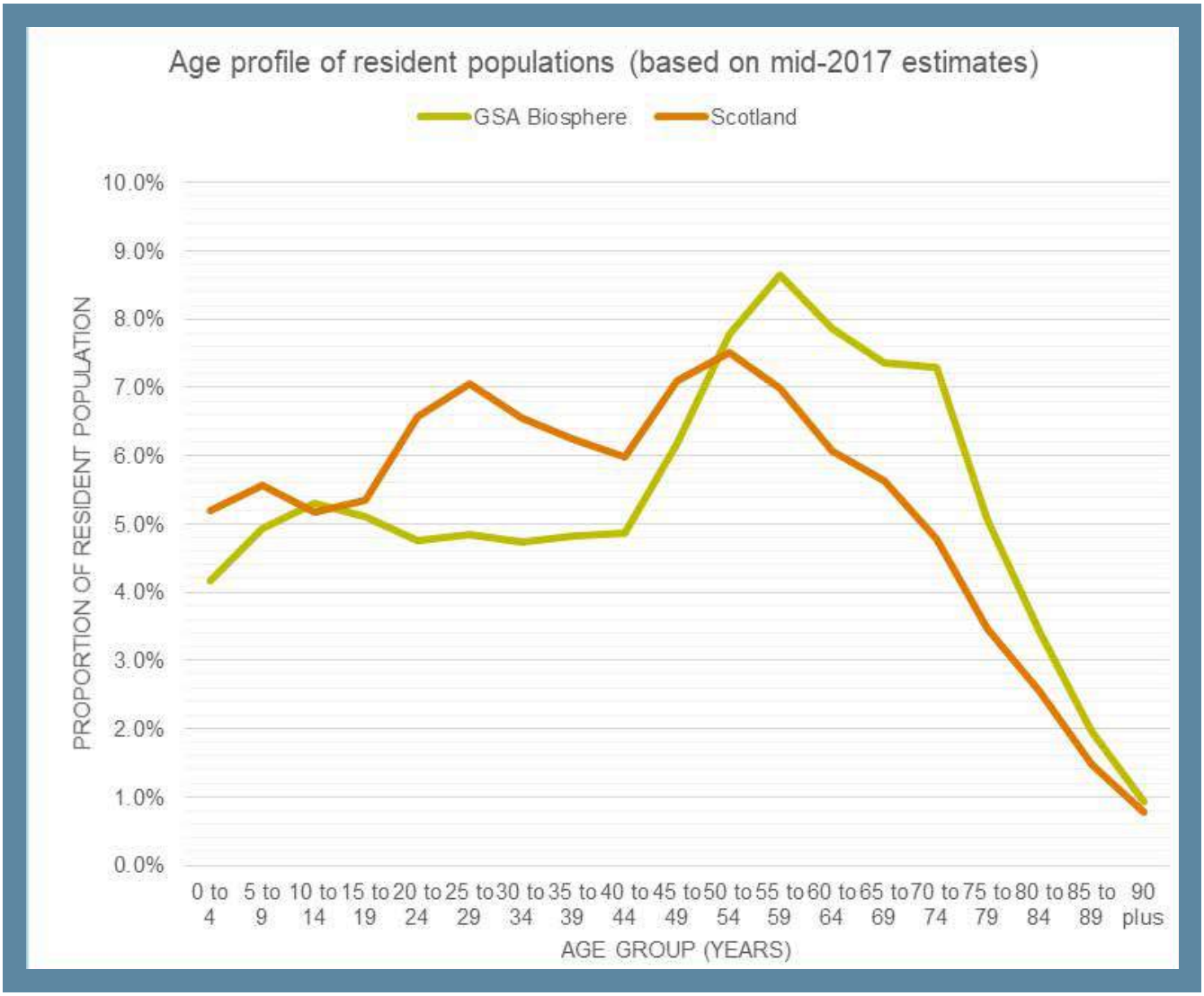
Population density

Across the data zones that make up the Galloway and Southern Ayrshire Biosphere, there is a wide variation of dwelling per hectare rates with 53 of the data zones within the Biosphere boundary demonstrating a dwelling per hectare density of less than 0.05. Across the Biosphere, the 2011 census data estimated that there were 18 people per square kilometre, equating to 0.18 people per hectare. This density is far lower than that of Scotland overall with 68 persons per square kilometre, equivalent to 0.68 per hectare demonstrating the sparse and rural nature of the Biosphere settlements. The sparse population density of the GSA Biosphere means that when comparing social and economic trends comparison should be made with other rural communities.

Age structure

Rural areas of Scotland generally have an older age profile than urban areas, usually influenced by the long-established patterns of younger people leaving them for more education and employment opportunities in the towns and cities.

At the same time older people have retired into the area drawn by attractive countryside and a rich cultural offering, until recently at least often reinforced by competitive house prices. The demographics of the population within the local authority areas that cover the GSA Biosphere are shown below. As depicted within the graphic, the resident population is skewed towards those aged between 45 and 70 years old. When considering the age profile against the national Scottish trend, this skew towards a more elderly population is also evident, with a greater proportion evident in the Galloway and Southern Ayrshire Biosphere when compared to the national average. However, this trend is consistent with the wider patterns across rural Scotland.



Household type

Just as the GSA Biosphere region has a higher proportion of people aged over 65 years than the Scottish average, there is also a higher proportion of properties which are either vacant or kept as second-homes.

This disparity was highlighted by stakeholders who raised the number of vacant and second homes as one of the key social issues within the GSA Biosphere. The result is a lack of affordable housing for resident and younger property buyers who are forced to buy properties elsewhere.

This trend has been reported to have become more of a problem over the last 10 years as the popularity of the region for second homes has increased. The role that the GSA Biosphere will have to play in fostering communities and raising social issues will become more important as this challenge increases in the future. The Scottish Government data shows that 93% of households within the Biosphere are occupied compared to the national average of 95%.

EDUCATION

Within the Biosphere there are 94 schools, all of which are government-run. The majority of these are primary schools, with 13 secondary schools and 5 schools catering for children with special needs also present. Information from the 2011 National Census, which represents a baseline for when the GSA Biosphere was established, showed a lower educational attainment of all adults relative to Scotland as a whole. 35% of adults in the Biosphere had no qualifications compared to 27% of people across Scotland.

This trend was also reflected in the proportion of the adult population who had a Level 4 and above qualification (for example, those with a Higher National Diploma, university degree or similar). 19% of adults in the Biosphere and 26% of the general population were recorded as achieving and holding a Level 4 qualification. This trend is likely to be attributable to a number of factors including the age profile in the GSA Biosphere and changes in education policy over the last 50 years. A shortage of graduate employment options may also deter those with higher levels of educational attainment from staying or moving to the area.

For young people in schools, a number of educational indicators as shown in the table below have generally improved between the years of 2016 and 2020 for both the GSA Biosphere and Scotland overall. Only minor variance is evident in the high attendance rate across the GSA Biosphere. Despite this declining by 1%, this still remains in line with the national attendance rate. There is a notable reduction in the percentage of 16–19-year-olds who are not in education, employment or training.

Education indicators 2016 - 2020

Education indicator	GSA Biosphere, 2020	GSA Biosphere, 2016	Scotland, 2020	Scotland, 2016
Average score for attainment of school leavers	5.6	5.4	5.5	5.5
Average number of school pupils with 'high attendance'	81%	82%	81%	84%
Average proportion of school leaver aged 16-19 not in education, employment or training	2.7%	7%	4.8%	7%

The proximity of higher and further education provision within an area can be crucial both to retain population and to generate jobs, especially high-quality ones. There are a number of further and higher education facilities in close proximity to the GSA Biosphere, with many of their students living within the Biosphere boundaries. This includes Ayrshire College and Dumfries and Galloway College which provide a wide range of technical courses. Although the Biosphere itself doesn't directly support such institutions it has developed Learning Partnerships with them which forge links and highlight opportunities for staff to use the Biosphere in their teaching. The creation of 'live briefs' provides training opportunities relevant to local employment opportunities. This approach can capitalise on and help justify the investments that have been made in bringing universities to the Crichton campus.

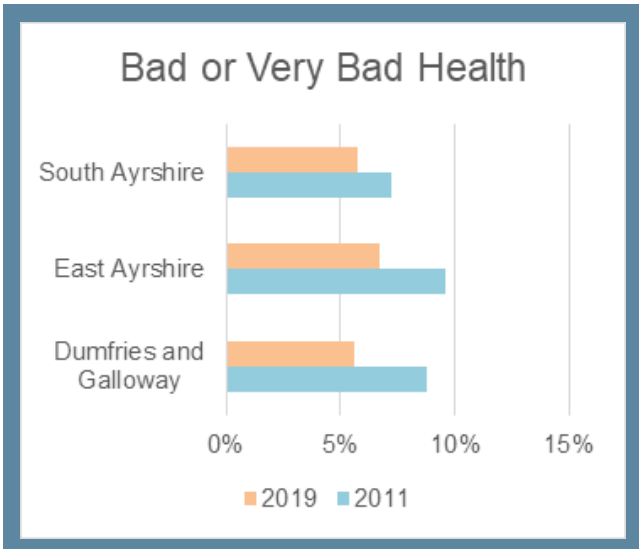
Several universities also have campuses near the Biosphere, including the Dumfries and Ayr campuses of the University of the West of Scotland (UWS) and the University of Glasgow Dumfries campus. The Biosphere team have supported both Universities through hosting visits and providing lectures to students.

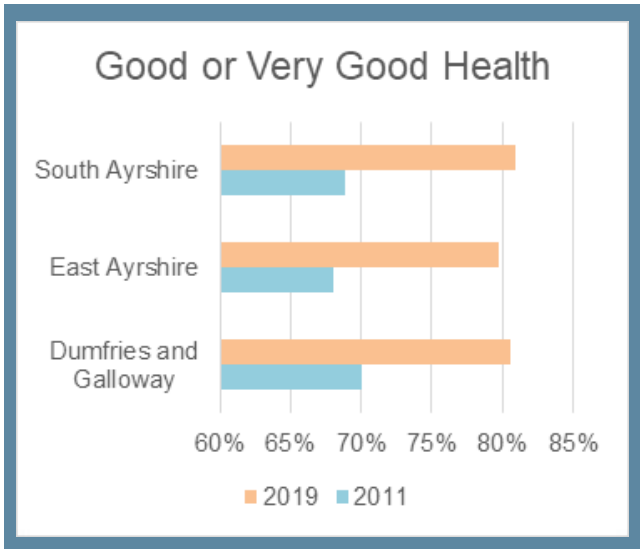
WELLBEING

Subjective assessment of health

The 2011 Census included a subjective question which asked, 'How is your health in general?'. The responses to this question, from the three Local Authorities within the Biosphere area show that 50% of respondents consider themselves in very good health, compared to 53% across Scotland overall. This reveals that on the whole, the subjective assessment of health is slightly lower than the national rate with fewer people identifying as having 'very good health' and more responding that they perceived to have 'bad health'.

The Scottish Surveys Core Questions recorded in 2019 also included a self-assessment on health. The results for each of the local authorities comprising the Biosphere area show that the relevant responses noting either 'bad or very bad' or 'good or very good' health perceptions, comparing the Local Authority level data from 2011 to 2019. Through this data it is evident that the overall perceptions of health are improving across the local populations, with positive trends shown across all local authorities.





Healthy life expectancy

For the period 2018-2020, the healthy life expectancy for residents within each of the local authorities is demonstrated below. The healthy life expectancy data demonstrates that whilst Dumfries and Galloway and South Ayrshire had higher life expectancies compared to the national rates, East Ayrshire performed worse than the Scottish national rates across all indicators.

	Healthy life expectancy at birth	Healthy life expectancy at age 65 years	Healthy life expectancy at birth	Healthy life expectancy at age 65 years
	Males		Females	
Dumfries and Galloway	63.1	10.7	61.4	11.3
East Ayrshire	57.2	8.3	59.4	10.2
South Ayrshire	61.8	10.4	63.7	11.6
Scotland	60.9	9.6	61.8	10.8

Disabilities

As of 2019, 28% of the Dumfries and Galloway population had a Limiting Long Term Physical or Mental Health Condition. This rate was similar to East Ayrshire where 27.3% had a limiting health condition, whilst the proportion within South Ayrshire was higher at 32%. All Local Authorities demonstrated higher than average rates of disability, with the figure for Scotland overall representing 25.9% of the national population.

Whilst the overall picture may show slightly lower health outcomes amongst the GSA Biosphere population, it is likely that this is largely due to the older age profile evident in the local area. Encouragingly, there is an evident improvement in health outcomes over the last decade from the qualitative surveys, indicating that the overall picture of health in the community is becoming more positive.

Culture and Heritage

The landscape of the Biosphere is rich in built and cultural heritage. This extends from the archaeological evidence of early settlers to the impact of emigration on the population of the GSA Biosphere over the last century. Although southwest Scotland is known for its agriculture and forestry it has also had its pockets of heavy industry, evidence of which can still be found in their towns and villages. For example, the cotton mills of Gatehouse of Fleet, the abandoned lead mines at Woodhead near Carsphairn or the Barony Colliery A Frame at Auchinleck. A key driver of the Coalfield Communities Landscape Partnership, of which the GSA Biosphere is a partner, is on reconnecting communities with their landscape and cultural heritage.

The culture and landscape of the GSA Biosphere countryside has been shaped by the people and groups that lived within it. The southwest of Scotland has long been a place of inspiration to the creative community with many being influenced by the quality of the daytime light, the darkness at night, the varied and appealing landscapes, the wildlife and the local people in their work. This has seen the emergence of a dynamic community of artists within the region and the Biosphere is home to a variety of galleries, theatres and cinemas. The Biosphere aims to take advantage of this tradition and resource to celebrate the cultural significance of the land and help reveal people's connection to the area.

Events of all shapes and sizes provide a focus for activity in the Biosphere, from annual events such as agricultural shows to music and arts festivals. The GSA Biosphere celebrates the culture of the region through active involvement in events such as the Wigtown Book Festival which focuses on regional and national authors often with elements focused on the natural environment. Spring Fling is a vibrant visual art and craft open studios event covering much of the Biosphere which celebrates the arts and music.

Through publishing events, venues and activities through social media and on its website and its partners the GSA Biosphere continues to provide visibility for many aspects of the regions culture. As explained further within the research and learning section this has included collaborating with the UNESO Biosphere network to share the culture of the GSA Biosphere with other reserves from Spain and Finland.

The Biosphere has worked closely with local communities to raise awareness and understanding of its culture through the PLACE (People Landscape Arts Culture Environment) project. This involved nine communities across three different landscapes within the Galloway and Southern Ayrshire UNESCO Biosphere: the Borgue Peninsula; the Wigtownshire Moors; and the Stinchar Valley. Participants were encouraged to take a closer look at their surroundings and learn more about their natural and cultural heritage, its value and to celebrate it through community projects and interpretation.

Biosphere Proud Supporters

Biosphere Proud Supporters is a growing body of businesses, organisations and individuals. It was first set up by the GSA Biosphere as a way of connecting to local people, enabling them to show support for the Biosphere through signing up to the Biosphere Charter. It is now an active group counting over 400 sign ups including 200+ businesses, 70+ organisations, 15+ community representative organisations, 7 schools and colleges and 100+ individuals.

Biosphere Proud Supporters are business and community champions and advocates of a sustainability ethos, and as noted at engagement workshops a dedicated Facebook group has been instrumental in keeping communities engaged and informed.

The Proud Supporters initiative is one of the successful initiatives of GSA Biosphere that is now shared with other UNESCO Biospheres as a part of ongoing sharing of best practices.

Biosphere Communities

The Biosphere Communities initiative encourages local communities who have already signed up as Proud Supporters to go a step further in their commitment to the Biosphere's Sustainability Charter through taking part in initiatives such as Sense of Place and Carbon Literacy, and to promote their communities as destinations in a UNESCO Biosphere. Since its launch seven communities have taken part, making it become one of the most well-known community initiatives in the Biosphere. 40% of participants in the online survey results were aware or had been involved in the initiative. It has also received focused positive feedback from participants.

Glentrool Biosphere Community

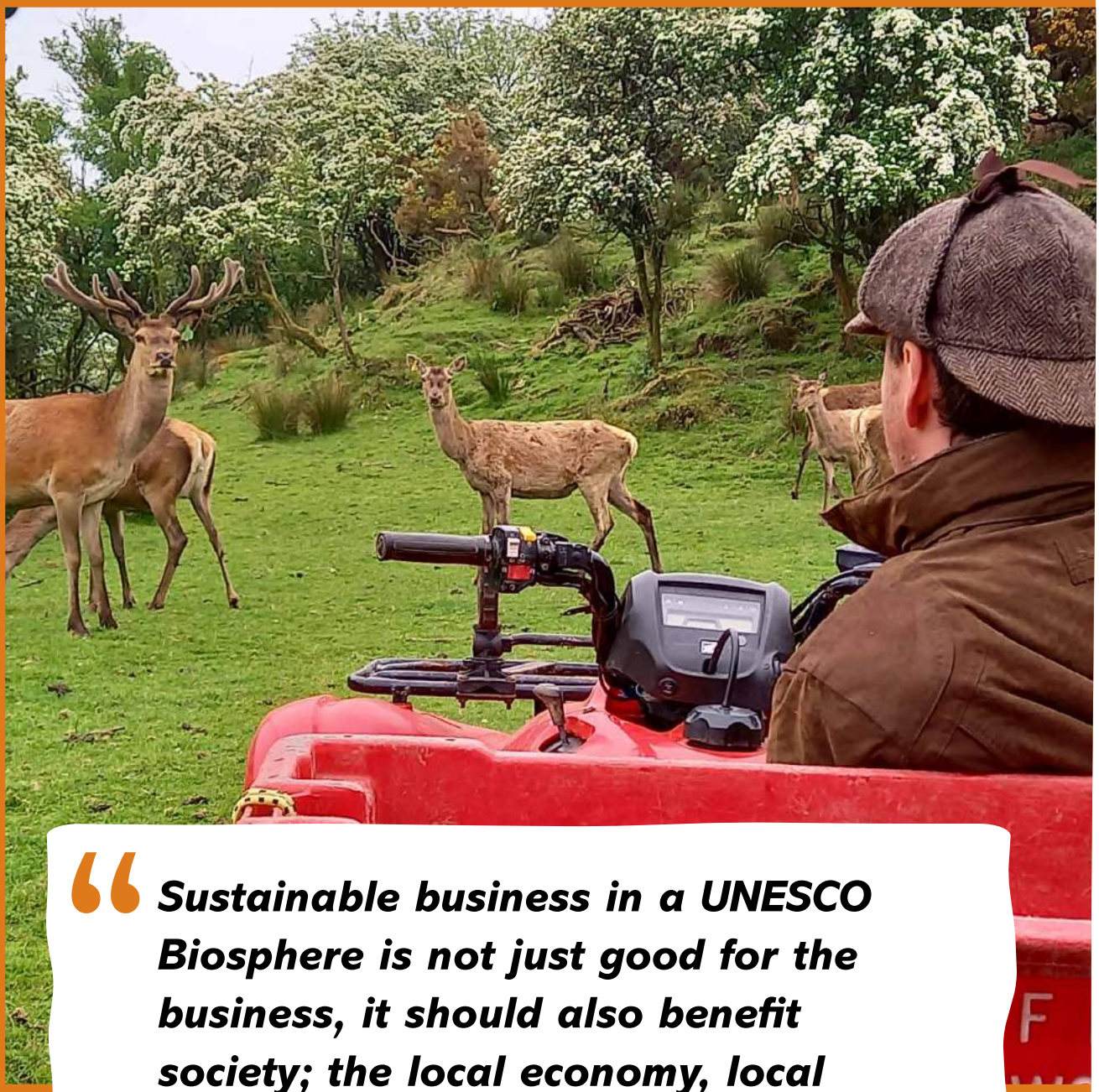
Glentrool was the first Biosphere Community in Galloway and Southern Ayrshire. Biosphere officers worked with the community to support and develop their aspirations to find a more sustainable future for Glentrool through the SHAPE project.

This involved bringing together a cross section of stake-holders with an interest in Glentrool a process of mapping tangible and intangible assets, along with community workshops exploring 'Sense of Place'. From this emerged the wealth of assets cultural, natural, history, heritage, local stories and people's passion for the place. Discus-sions on the opportunities for collaborations followed and initial ideas began to emerge on how those assets could be shaped into a new tourism offer for the village.

"We've found that being recognised as a Biosphere Community enables us to present our own community as part of a wider area that has internationally recognised ecological importance. The Sense of Place workshop fitted very well with elements of our community regeneration plans. W are keen to raise awareness of the social and natural history of the Glentrool area and capitalise on these assets as we develop a programme of outdoor activities, workshops and field trips. In fact, a Sense of Place is exactly what we hope to create."

Meta Maltman – Chair of Glentrool and Bargrennan Community Trust

ECONOMY AND BUSINESS



"Sustainable business in a UNESCO Biosphere is not just good for the business, it should also benefit society; the local economy, local communities, and local environment."

A high proportion of employment is in the land-based sectors with 8% of all adults employed in rural sectors compared with only 2% across Scotland. The largest sectors are transport, wholesale and retail and human health and social work. Historic sectors such as mining and quarrying are far smaller but have left a large mark on the economic landscape on villages and towns in the Biosphere, with high levels of unemployment and social deprivation. There are also fewer opportunities for well-paid sectors.

A key finding is that while employment opportunities are available across much of the GSA Biosphere, these are often poorly paid and of low quality, with few opportunities for graduate level employment. The large numbers of businesses in resource-based industries (agriculture, forestry and fishing) do not translate into plentiful job opportunities in these sectors. Relatively large numbers of people across the GSA Biosphere are self-employed and a very high proportion of businesses have nine or fewer members of staff. There are also regional differences with higher rates of unemployment in the north of the GSA Biosphere.

The economy within the GSA Biosphere has seen several notable changes in the last 10 years during the GSA Biosphere's operation. Positive economic trends include the increase in sustainable tourism and the COVID 19 pandemic has led to a shift change in attitudes on many levels. There exists a priority to reset tourism in a responsible and sustainable way. GSA Biosphere has been well positioned to respond to this having had sustainable tourism as a core objective for many years and a commitment to the development of eco-tourism and sustainable tourism initiatives through its collaborations and project delivery. Such examples are Scotland's UNESCO Trail and the transnational project SHAPE – Sustainable Heritage Areas: Partnerships for Eco-tourism.

Over the past 10 years, there has been a general trend towards intensification across a number of different sectors including agriculture, energy and forestry. This has contributed to negative impacts on the environment such as acidification of water course and homogenisation of the landscape as discussed within the Natural Environment section.

The climate of south-west Scotland is well suited to growing Sitka Spruce, the corner-stone of commercial timber plantations, and the grass crop which is the basis of the intensive dairy industry. Lack of infrastructure within GSAB means there has been limited value-added to the primary timber and milk products

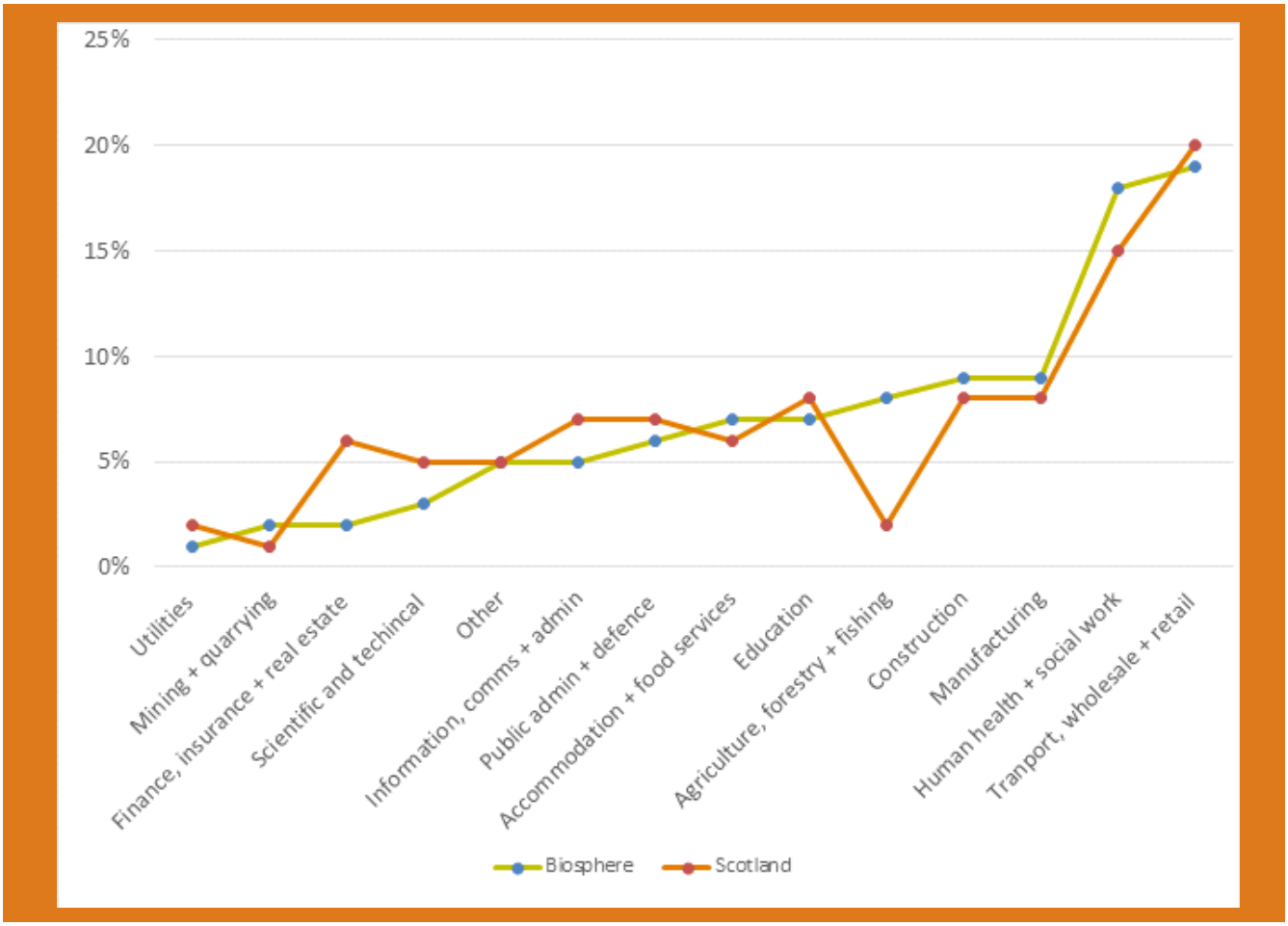
Instead processing jobs and their economic benefits tend to lie outside the Biosphere for example at Lockerbie saw-mills. The same applies to meat and dairy processing. The Biosphere Board aims to counter this by encouraging a more local business model with more localised secondary processing.

Employment in the GSA Biosphere

Employment within the Biosphere is predominately within land-based sectors, which is not unexpected. 8% of all adults who live in the GSA Biosphere are employed in rural sectors (agriculture, forestry and fishing) compared with only 2% across Scotland. However, these occupations provide far lower rates of employment in the Biosphere than other sectors such as transport, wholesale and retail (19%); and human health and social work (18%).

Just 2% are employed in mining and quarrying despite the former importance of this sector in towns such as New Cumnock and Kirkconnel. There are fewer opportunities for employment in professional employment and relatively well-paid sectors such as information, communications and administration, and finance insurance and real estate.

The average travel times to key services are higher across the GSA Biosphere than for across Scotland - both by public transport and car. Stakeholders reported this as one of the key challenges of living in the area and noted that in many areas public transport is less frequent. In villages and towns where public services have closed alongside this deterioration of public transport, the problem is particularly acute. Lack of transport options makes accessing employment more difficult in the GSA Biosphere, especially for those who are dependent on public transport.



High potential for tourism development across the GSA Biosphere

Sustainable tourism has increased over the last decade and there is great potential for tourism to play a larger role in the future. There is a consensus among stakeholders that the area's mosaic of different attractive landscapes, historic and cultural interests and opportunities for a wide range of outdoor activities all add to its appeal. Research conducted by the South of Scotland Destination Alliance (SSDA) showed that there is an increased interest from consumers to visit GSA Biosphere due to the region's enhanced reputation.

The GSA Biosphere is keen that any potential developments must be balanced with maintaining tranquillity and should not damage the natural assets being promoted – that is, they should be sustainable tourism experiences that maximise positive benefits for communities and the environment. Coordination of online tourism promotion with other local and national organisations has been shown to raise the tourism potential of other Biospheres. Working with local communities to develop experiential, authentic ecotourism is a way of ensuring developments are genuinely sustainable.

This vision aligns with the National Tourism Strategy: 'Scotland Outlook 2030, Responsible tourism for a sustainable future':

"Tourism is acknowledged as having a significant role in delivering Scotland's wider economic strategy as it cuts across every sector and touches every part of Scotland's economy. However, this ambition goes beyond that; it will look to enrich the lives of those who live here and visit us; it will protect and preserve our places, with Scotland's tourism industry acting as pioneers for delivering responsible tourism."

"Our picture of success is one where communities embrace visitors and the stories of our destinations and world-famous assets are brought to life by Scotland's people; where strong partnerships are in play to protect and enhance our environment whilst growing social, cultural and economic wealth.

The Biosphere Certification Mark

The Biosphere Certification Mark is one of the most impactful tools the GSA Biosphere has developed to support business and foster a knowledge sharing practise within the business of the Biosphere. It was launched in June 2018 to promote and add value to those businesses in the Biosphere whose products or services are contributing towards sustainable development. After successfully piloting certification with just 3 local businesses in 2018, the Biosphere Certification Mark has since been awarded to over 34 businesses based within the Biosphere region who fall into any of five categories: Food and Drink, Accommodation, Activity and cultural services, Agriculture, horticulture and Creative Industries. Certification is free for participating businesses and is granted for 3 years. The Biosphere Certification Mark was one of the GSA Biosphere business initiatives that had the highest awareness across the stakeholder review and led to the Biosphere team winning the Nature of Scotland Business award in 2020.

Certification criteria are aligned with the Biosphere's commitment to promoting sustainable business operations and supporting the local community and are as follows:

- Supporting the Biosphere and promoting its special qualities
- Business Operation - Reducing environmental impact: Distribution, Purchasing and Transport
- Business premises and surroundings: Managing to enhance the Galloway and Southern Ayrshire Biosphere and protect its valued characteristics
- Supporting the local community, businesses and networks

The inspiration for the certification mark was through learnings from similar certification schemes in the Rhon Biosphere, Germany and Entelbuch Biosphere in Switzerland.

The programme is supported by a dedicated Business Development team who assist the applicants and certified businesses with networking opportunities, sustainability advice and marketing support. The advice provided by the business development team is a combination of marketing tools such as the Sense of Place toolkit, example statements for businesses and communities wanting to promote their positive association with the Galloway and Southern Ayrshire UNESCO Biosphere, guidance on changes they can make to their operations so that their business becomes more sustainable and sign posting to other organisations or businesses who may be able to offer support.

Stakeholders from businesses across the Biosphere stated that the network of other business and associated knowledge sharing that the Certification Mark provided was one of the most influential factors in being involved. Businesses can learn from others within their field and market sustainability credentials effectively to customers. Examples include Nithbank Country Estate who celebrate their Green story on their website, including their Green Tourism awards and plan to become a more sustainable business.

In 2022, businesses will now be able to benefit from a programme of GSA Biosphere run webinars to help them share their 'Sustainability Green Stories' . The Green Stories webinars are aimed at Biosphere business owners who feel they could benefit from some guidance and tips on how to talk about sustainability, particularly how to share their journey with customers online Examples of case study businesses within the GSA Biosphere Certification Mark are provided within the relevant economic section below.

"We were keen to apply for the Biosphere Certification Mark – the next step in evidencing our commitment to being a sustainable and ethical business. In achieving this we're joining a wide variety of other businesses from the leisure, food production and retail sectors in making a commitment to our local area. It's a unique certification that covers many different facets of sustainability and ethical trading. The certification mark isn't a 'box ticking' exercise, it's a live and evolving process which prompts us to regularly revisit our practices and our supply chains to ensure we are living up to our commitments."

Gallovidia Books

KEY ECONOMIC SECTORS

Agriculture

Farming is the largest land based economic activity in the Biosphere with 38% of land being farmed, mainly for sheep and beef cattle, although there is intensive dairy farming on the lowlands. Game and wildlife management is also a small but notable sector locally. The mild climate and high rainfall of the area make it well suited to livestock farming when compared to other regions within Scotland. This suitability to certain types of agriculture has seen an increase in the specificity of the farms within the Biosphere with greater numbers of intensive dairy and beef farms.

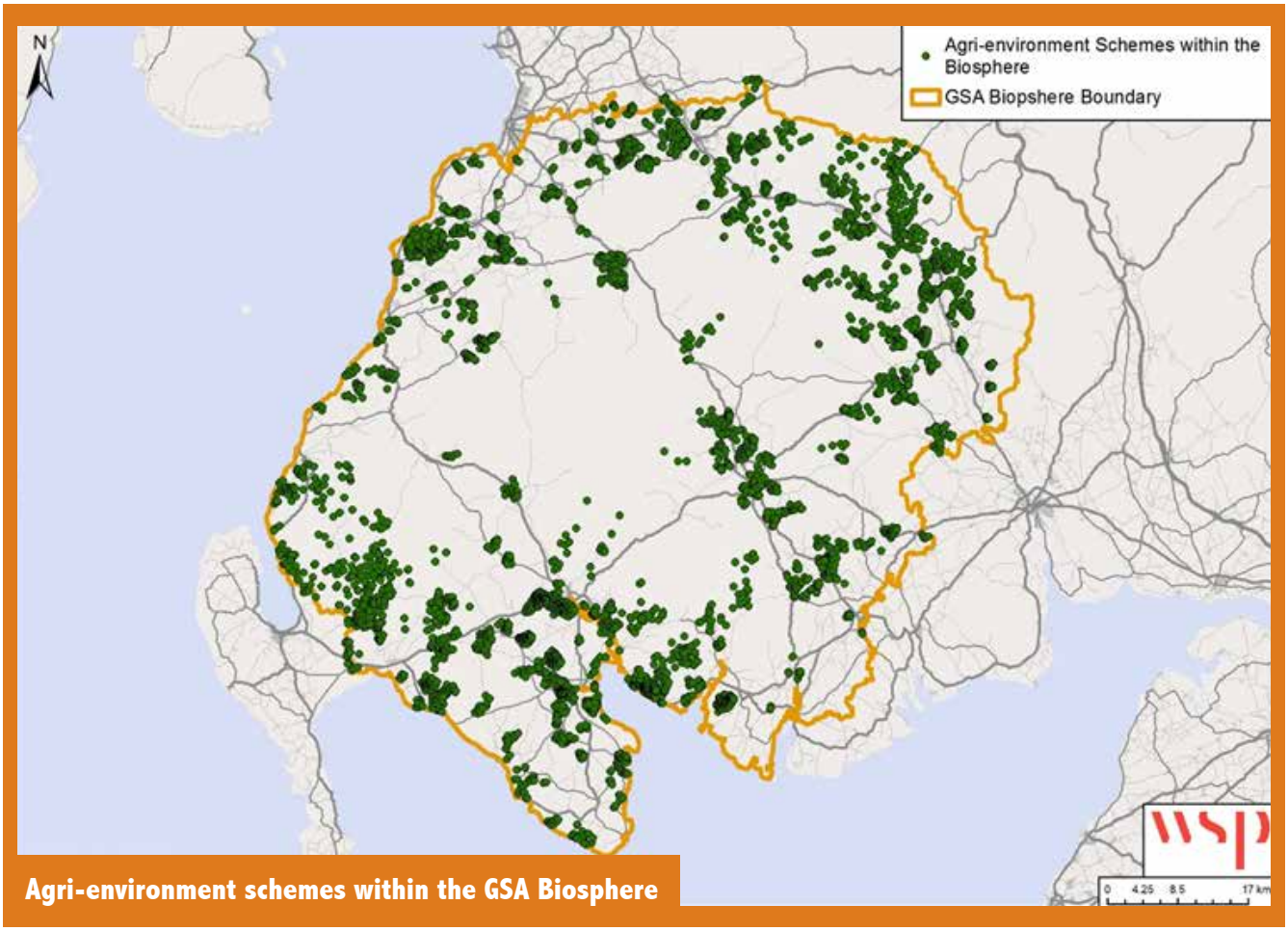
The June 2021 Agricultural Census shows that Ayrshire and Dumfries & Galloway contain 20% of all the sheep within Scotland with Dumfries and Galloway containing over a million individuals. In addition, Ayrshire and Dumfries & Galloway were estimated to contain 177,491 of the 258,994 dairy cattle in the whole of Scotland, with Dumfries and Galloway holding almost half of the total number. The two regions are also estimated to hold 65, 632 of the 244,186 beef cattle across the whole of Scotland. Only Grampian as a region was estimated to have a higher number of beef cattle than Dumfries and Galloway. This suitability for cattle is having significant environmental and social impacts which are detailed further with the Natural Environment section such as the increased quantity of slurry, run off and homogenisation of the landscape.

As a predominantly rural area, the relatively high proportion of employment in land-based sectors is not unexpected. In 2015, 8% of all adults who live in the GSA Biosphere were employed in rural sectors (agriculture, forestry and fishing) compared with only 2% across Scotland. The agricultural sector provides important cultural and social aspects in addition to the economic benefits. Rural communities are dependent on the stability of rural agricultural practises to ensure retail services like local shops and pubs are still viable.

There are existing socio-economic issues within the agriculture sector. In the uplands the combination of older farmers retiring and land prices increasing has resulted in young farmers being unable to afford to pursue a long-term career in agriculture. Many farms are sold at inflated prices to investors seeking carbon credits through forestry. On the better land farms are being amalgamated and intensified, often for purposes of dairy. The loss of individual farms has changed the makeup of rural communities. It has created less dependency on local services such as retail, garages, health, education which in turn leads to communities having to travel increased distances for basic requirements.

Over the last 10 years habitat focused agri-environment schemes administered in partnership with Scottish Natural Heritage (now NatureScot) have created a range of environmental benefits. There have been over 9,234 different agri-environmental applications within the Biosphere over the 10-year period. In 2015 the existing rural payment schemes across Scotland were updated under the EU Common Agricultural Policy and as a result many of the different applications cover the same property or area. These schemes covered a total area of 238,931 hectares between 2011 and 2015 and 212,270 hectares since 2015.

The most popular scheme by area was Moorland management (livestock only) with 149,356 hectares. This scheme requires landowners to follow a moorland management and grazing plan to benefit a range of moorland habitats, including upland heath and peatland habitats, by maintaining appropriate levels of wild and domestic stock. The other Agri-environment schemes within the GSA Biosphere range from riparian planting, conversion to organic farming practises, the use of cover crops and diversification of planting. For the last few years most Agri-environment schemes have been focussed on designated sites due to limited resources.



Agri-environment schemes within the GSA Biosphere

Kitchen Coos and Ewes – Case Study

Kitchen Coos and Ewes is a Biosphere Certified Business offering agri-tourism farm tours that introduce visitors to their Highland Cattle, where they learn how the cattle are managed to enhance the natural environment.

The business is based on the public's curiosity and interest in farming, farm animals and food production. The owners as well as introducing the visitors to the Highland Cattle show the public the features on the land that benefit biodiversity. They have a mosaic of many different habitats which include improved pasture, wetlands, heather moorland, native woodland, ancient woodland pasture and, they have water margins fenced off on both sides to encourage water voles to flourish.

"We have always believed in getting involved with groups that have a common purpose. As soon as we looked at the aims of the Biosphere, we believed that our agri-tourism business was a perfect fit, and our involvement would strengthen the group. Belonging to a larger group of businesses which all share the same objectives would consequently increase the potential for our enterprise to be successful".

Forestry

Commercial forestry is recognised as one of the major industries within the GSA Biosphere, with the buffer area being based on Galloway Forest Park, the largest forest park in the UK. This area is managed by Forestry and Land Scotland whose purposes extend beyond just timber production to include recreation and biodiversity, and in the past have demonstrated best practice in multi-benefit forest management. Forestry has a large economic impact with many secondary impacts such as the creation of new roads and jobs within transportation. However, the lack of processing infrastructure within has resulted in the majority of the benefits from secondary products such as timber being realised outside of the GSA Biosphere. Much of the timber grown has been produced at the Lockerbie Sawmill which is outside of the boundary and provides many jobs locally. This timber is then distributed globally recuing the benefits received by the communities within the GSA Biosphere.

The large-scale private forestry occurring over much of the rest of the Biosphere is more focused on timber production that responds to market demand and opportunities for carbon credit offsetting. The Scottish Forestry spatial data estimates that 5,458 hectares of woodland planting has taken place under woodland plantation grant schemes since 2012. 85% of this woodland creation has been coniferous woodland for timber production.

This type of forestry has contributed to inflated land prices that preclude younger local entrants from entering the market. Demand for forest products is increasing, with a strong wood fuel and biomass market, widespread timber for pallets, fencing and gates.

Government policy to meet targets for renewable energy, ongoing afforestation and commercial forestry are now key drivers of change in rural land use towards forestry. Participants of all the stakeholder workshops expressed concerns over forestry expansion, particularly its impact on rural farming, biodiversity and the lack of appropriate local community consultation on forest plans.

Energy

Since the 1930s the GSA Biosphere has been home to substantial renewable energy generation through large scale hydro power. In more recent time this has shifted to wind energy, with Windy Standard being one of the first commercial wind farms in Scotland when it was commissioned in 1996. Since then, wind energy has increased exponentially as Scottish Government seeks to reach its ambitious 2045 Net Zero target identified in the Climate Change Act 2019. The expansion has led to conflicts over land use and the landscape impacts.

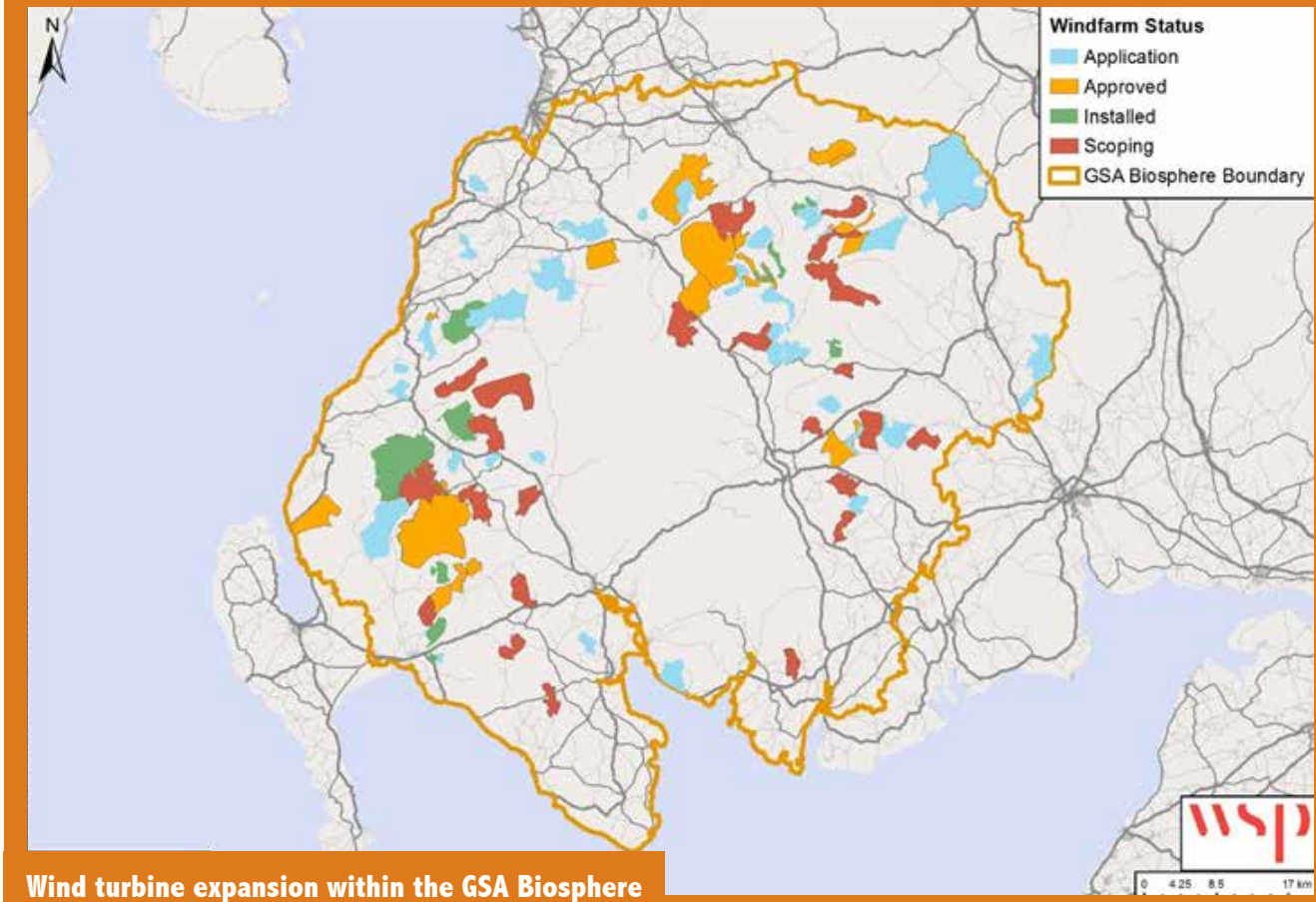
There are currently 11 windfarms in operation with another 19 approved for construction. There are an additional 42 applications for future windfarms and another 31 undergoing a scoping process. This could lead to a total of 73 additional windfarms if all potential sites were to gain approval.

In recent years the size of wind turbines has also increased significantly from an average of 75m in height during the 1990's to applications for 250m+ today. With local hills only being an average of 600m in height it is felt by many that new proposals are out of scale with the local landscape.

Whilst to date all such developments have been within the Transition area of the Biosphere where sustainable development is actively supported, in recent years developers have been pushing for large developments within the Buffer area. The Partnership Board have been concerned about the loss of 'sense of place' within the Buffer of the GSA Biosphere from windfarms and fear that opening up this area to development will lead to a flood of new applications.

Communities are often divided with those supporting more windfarms and the community benefit funds they generate, and those who see them as an imposition on the landscape. Though some stakeholders mentioned that windfarms are bringing in funding and opportunities for community projects, the majority viewed continuous windfarm expansion negatively. They were specifically concerned about wind turbine impacts on the landscape, wildlife, health and wellbeing of local people and tourism. Communities felt that the number of windfarm planning applications was overwhelming and that they had little influence over their development. While providing a positive contribution in terms of transition to renewable energy sources, Gross Added Value (GVA) and job creation, the actual and prospective growth in the number of wind turbines in the area underlines the need for a more strategic assessment of their long-term impact on wellbeing, natural capital (notably the landscape), and tourism.

The GSA Biosphere Partnership board has engaged with developers over the impact of wind farms across the Biosphere and set out a position statement in 2017, "It is the view of the partnership that wind farm development in the Core and Buffer Zones of the Biosphere are not suitable or supported due to their adverse impact on the region's natural environment and economy; however, they could be acceptable in the Transition Zone when the environmental impact is minimal and can be effectively mitigated, and communities have been engaged and are supportive of the development."



Wind turbine expansion within the GSA Biosphere

Tourism and recreation

Whilst the UNESCO Biosphere area is an important tourism destination with just over 900,000 visitors per annum in 2019, its visitor number are still very modest in comparison to Loch Lomond and Trossachs National Park just to the north, which receives in excess of 7 million visitor days and 4 million visitors annually and the Lake District National Park just to the south which receives over 15.8 million visitors annually.

Gross Value Added from sustainable tourism for the Local Authorities in the GSA Biosphere were £78.1m for Dumfries and Galloway, £121.5m for South Ayrshire and £50.2m for East Ayrshire in 2018. There was an increase in the GVA provided by tourism across the three regions in 2018 compared to 2015, and a corresponding increase in employment in the sector, from the previous year. In terms of demand in the tourism industry, domestic travellers continued to dominate in 2017-2019. In Dumfries and Galloway and Ayrshire and Arran, tourists from Great Britain accounted for 95% and 89% of all overnight trips, respectively.

Tourism spend within Local Authorities 2010 - 2019

The Biosphere also has a small but quality selection of hotels and guest houses to suit all budgets, including Turnberry Hotel and Golf Course, a regular venue for the British Open. Self-catering is growing quickly with approximately 1,260 self-catering properties in the Biosphere and a growing number of 'glamping' and motorhome touring sites. The GSA Biosphere actively supports the development of the sustainable tourism industry within the region through support, knowledge sharing and raising awareness. Biosphere Proud Supporter Businesses are highlighted on its website whilst activities, adventures and Biosphere attractions are marketed in collaboration with strategic partners such as Visit Scotland and the South of Scotland Destination Alliance. The latest example being the new Scotland's UNESCO Trail – a world first where 13 UNESCO designations have been brought together in a national trail that showcases the country's offerings while celebrating sustainable tourism.

"Encouraging sustainable practices in business and in communities is something that we see as being at the heart of tourism now. Putting a bigger emphasis on community will ultimately be good for the visitor, and is something that we see the Biosphere creating with the businesses and communities that they work with."

Gordon Smith - VisitScotland – Strategic Partners Workshop

The impacts of Covid-19

While such indicators of regional tourism development as GVA and Employment demonstrated growth in 2015 -2018, the lack of similar data for 2019 onwards does not allow measurement of the quantitative impact of the pandemic or draw conclusions on the overall trajectory of the sector development in the Biosphere. The review therefore used other indicators such as number of visitors for individual attractions and average occupancy rates for most popular formats of tourist accommodation in local authorities forming the Biosphere territory, to evidence prevailing trends in tourism.

At least six major paid and free tourist attractions are located within the GSA Biosphere geographic area. However, recent visitor numbers enabling comparison with 2015 are only available for two attractions: Galloway Forest Park and Culzean Castle and Country Park. The former, which remains one of the top free attractions in Dumfries and Galloway, experienced a slight decline in visits, while the latter, despite being a paid attraction, saw significantly higher visitor numbers in 2019 compared to 2015.

Full data for 2020 has not been published but Culzean Castle and Country Park experienced a sharp 61.6% drop in paid admissions from 2019 to 2020, most likely reflecting the impact of pandemic-related travel restrictions introduced in 2020.

Average occupancy in tourist accommodation is another reliable indicator of regional tourism industry performance. Hotels and self-catering accommodation are the most popular types of accommodation for visitors in Dumfries & Galloway, according to Visit Scotland data (2016).

Scotland's UNESCO Trail

Scotland's UNESCO Trail, launched in October 2021, is an initiative that promotes responsible tourism in 13 UNESCO place-based designations in Scotland, including the GSA Biosphere, through a suit of digital assets, including dedicated web pages hosted on VisitScotland.com, new itineraries, and Scotland's UNESCO Trail videos.

In partnership with VisitScotland GSA Biosphere is encouraging visitors to explore Scotland and find inspiration in the Biospheres, and other designations such as World Heritage sites, Creative Cities, and Global Geopark. The trail promotes local enterprises that are working towards the UN's Sustainable Development Goals and features links and resources to help visitors make their journey around Scotland as 'green' as possible, with guidance on using public transport, charging electric vehicles, and exploring the Biosphere by bicycle.

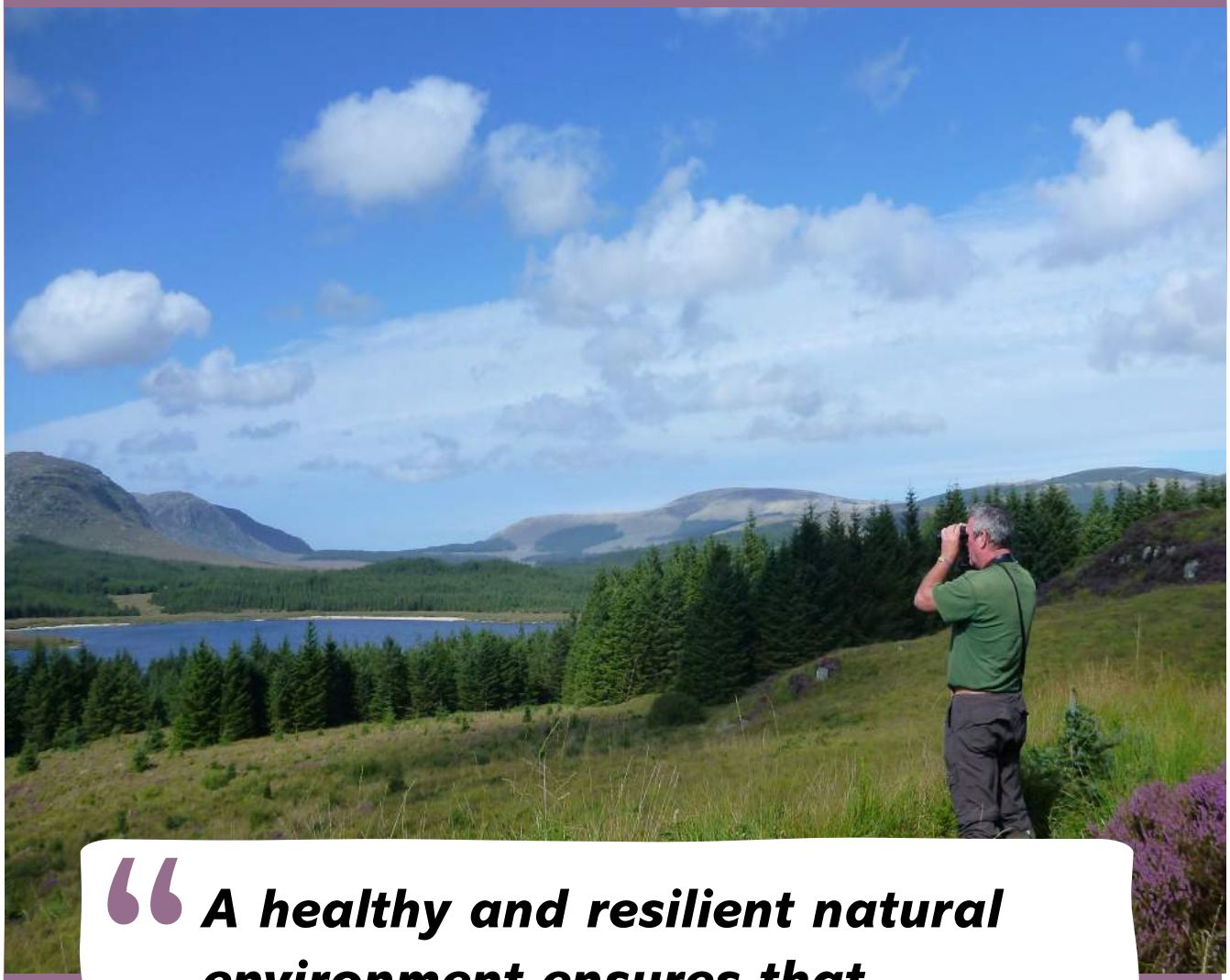
The website allows the user to create their own personal Biosphere trip filled with recommended outdoor activities, cultural attractions and local food and drink from the recommended routes. It provides a great opportunity to celebrate exemplar Biosphere business by providing awareness of the Certification Mark and Proud Supporters and showcasing Biosphere Communities.

The UNESCO Trail is set to have a transformative effect on the growth of responsible tourism in the Biosphere through promotion, visitor education and creation of a new impetus for local supply chain development at a community level.

"The UNESCO Digital trail has shown how ahead of the game the Biosphere is with regards to responsible tourism, community engagement and community development. These have now all come straight to the forefront of sustainable tourism."

Regional Development Officer VisitScotland – Strategic Partners Workshop

NATURAL ENVIRONMENT



"A healthy and resilient natural environment ensures that future generations can enjoy the same quality of life that we do today."

The UNESCO Biosphere designation is recognition of the fantastic array of landscapes, wildlife, and learning opportunities that the GSA Biosphere presents. The geography of the terrestrial area ranges from the remote uplands of the Galloway Hills with its myriad of lochs and bogs, through farmland and forests to the cliff tops, estuaries and beaches of the coast. The wealth of natural habitats is recognised by the many designated sites that can be found across the extent of the GSA Biosphere and the number of species of importance present. The quality and variety of these different habitats is one of the features of the Biosphere most commonly mentioned by stakeholders when questioned over the attraction of the Biosphere.

The landscape and habitats within the GSA Biosphere are the product not only of geology and natural processes but also of the long history of human occupation and activity, with much of it traditional low intensity land management. This relationship has been changing in recent decades as agriculture has been pushed to increase productivity, demand for timber has increased and the need for renewable energy has risen up the agenda. Across the GSA Biosphere, biodiversity and land use is facing unprecedented challenges due to climate change, social and economic pressures and environmental degradation. Species loss, homogenisation of the landscape and intensification of agriculture were all listed as negative changes within the natural environment by stakeholders and experts. Biodiversity losses across the wider region reflect these pressures and their impact on not just protected species but those considered common and characteristic with the area.

The Biosphere has worked during the previous ten years to lead the way in protection and enhancement of the natural environment, providing inspiration to future generations. Core to the key objectives is to re-establish the relationship between people and nature by advocating and supporting initiatives that promote and celebrate more sustainable and better integrated land use.

LAND USE

With a management approach centred around ecosystem services and the principles of the Scottish Land Use Strategy, the GSA Biosphere has sought to address what are arguably some of the most intensive pressures for land use change in Scotland. Upland areas have seen an increasing number of renewables developments, whilst the adverse economics of sheep farming in particular were leading to an expansion of commercial forestry even before the drive for carbon sequestration and offsetting reinforced the trend.

Meanwhile on lower ground there is an increasing intensification of agriculture, resulting in thew removal of landscape features such as rocky outcrops and gorse scrub to enable high intensity grassland management (often involving three or four cuts of silage a year) to support large-scale dairying and beef production.

The GSA Biosphere recognises the value of these industries to local employment and the economy, and in some cases to addressing the climate change emergency but highlights that it is often happening in an insufficiently thought-through and co-ordinated manner, driven either by investment funding from outside the area or public funding pursuing national objectives and crudely specified targets without recognising the realities and nuances of regional conditions and local community priorities.

Over the last ten years GSA Biosphere has mapped its ecosystem services and used them to influence the production of a Natural Heritage Management Plan that identifies priority species and habitats across the whole of the Biosphere and gives management recommendations for landowners in how they can help to sustain them.

The Biosphere has also facilitated the bringing together of a diverse range of organisations whose livelihoods depend directly and indirectly on the land, to stimulate conversation and debate about the pressures that are faced and how best we can seek to get the maximum public benefit from the land for everyone.

A Changing Landscape – Making the Most of Our Natural Assets

St John's Town of Dalry - Friday 26th January 2018

This event was the Biosphere's first step towards bringing together a range of land use sectors, communities and private business to discuss approaches to land management, both now and in the future, the concerns and opportunities for the area and the appetite for implementing a land use strategy and regional land use partnership.

The Biosphere invited four speakers to represent their different sectors who started with presentation on their current positions, followed by a facilitated discussion involving questions from the audience. They included senior policy representatives from Scottish Woodlands and CONFOR, NFUS, Scottish Land and Estates and GSA Biosphere.

The event highlighted some of the key conflicts between different sectors but also identified an enormous amount of good will and more common ground than had been at first expected. GSA Biosphere used the outcomes in discussions with national partners to scope the potential for Regional Land Use Partnerships and the benefits such an approach could bring to rural areas

"Credit should be given to the Biosphere team for the ongoing engagement activity they have undertaken through awareness raising, organising of events and stakeholder engagements related to sustainable land use in the Galloway and Southern Ayrshire Biosphere" Teresa Dougall NFU Scotland, Regional Manager, Dumfries and Galloway

LAND COVER

Historic land cover

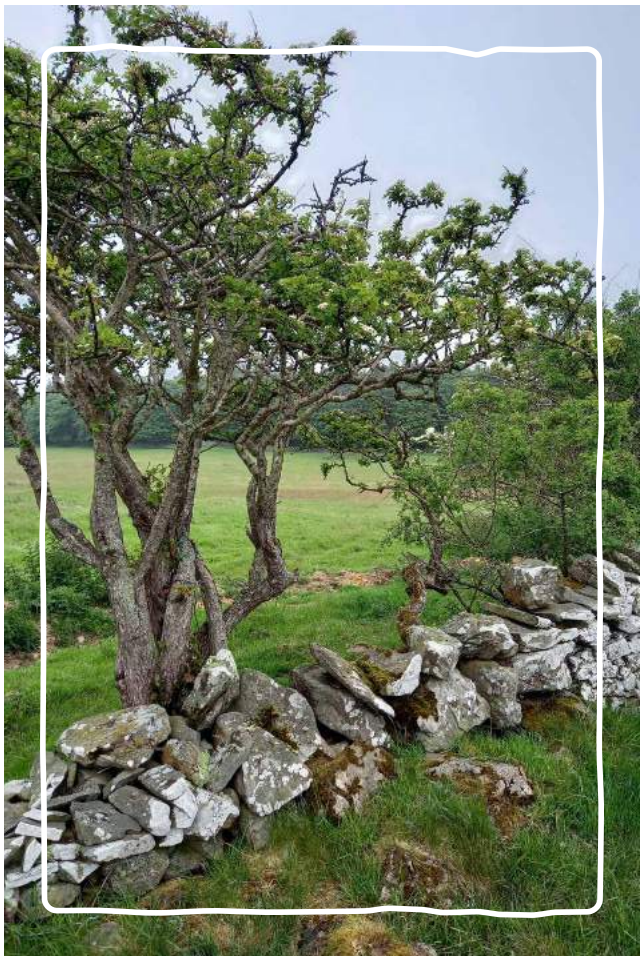
The environmental character and historic land cover of the GSA Biosphere was set out in The Socio-Economic Potential of the Galloway and South Ayrshire Biosphere Reserve Report (2008) during the application for certification as a Biosphere. The landscape was separated into uplands, woodlands, farmlands and water.

The Uplands covers the landscape of high domed hills and plateau and is recognised as a European mountain massif, just like the Scottish Highlands, the Pyrenees and the Alps. Over time large tracts of moorland have been turned over to forestry and improved grassland, but some heather moorland is still 'muirburned' to maintain the habitat. Cattle and sheep have grazed the hills for over 5,000 years, with sheep and coniferous forest becoming dominant during the last half century. This has reduced heather cover, allowing bracken and purple moor grass to take over.

Until 6,000 years ago, native woodland covered all of the valley floors, slopes and hilltops, today much of the land is farmed, grazed by sheep. Distinctive remnant native woodlands still survive mainly in gorges and glens, and fragments of ancient wood pasture exist. Tree plantations have a long history, starting hundreds of years ago with Scots pine and oak. In the 17th century, landowners began planting within the 'policies' of large estates, using a wide range of non-native species.

After the Second World War, there was a major expansion of coniferous forests, mainly comprised of Sitka spruce. These productive forests provide the vast majority of the tree cover in GSA Biosphere and have had a major impact on the landscape. Since the late 1980s, Forestry and Land Scotland has been combining timber production and landscape enhancement, and now forest design plans have more broad-leaved trees, Scots pine and open ground. Private commercial forestry continues to be big business, with increasing timber prices, availability of carbon credits and the favourable climate of southern Scotland all contributing to a notable increase in Sitka spruce production.

The lowland farmland is predominantly a pastoral landscape, of mainly temporary ryegrass swards, ranging from the drumlins of the Machars and central Stewartry to the rocky knolls of the Borgue area. Arable cropping, apart from fodder crops, is mainly confined to the larger fields of the Ayrshire coast and includes the well-known Ayrshire early potatoes.



Current land cover

The current land cover within the GSAB Biosphere is currently witnessing a series of changes due to a combination of human and climate change factors. Traditional land covers such as low intensity farming and upland heathland are being replaced with land management types such as intensive dairy farming and coniferous plantations. This economically driven transition, in combination with environmental decline and a changing climate, is leading to a decline in the amount of the traditional land cover types.

Coniferous plantations within the uplands are changing many historic landscapes into yield focused monocultures which provide fewer habitats for the majority of native species and have potentially negative environmental effects. The creation of coniferous plantations is far outweighing the creation of new broadleaved or native woodlands with 85% of all new woodland within the GSA biosphere being recorded as coniferous. This increase is driven by the increased demand for timber and carbon offsets and is continuing alter the composition of woodland within the Biosphere.

The growth of large-scale intensive dairy and beef industry within the area has led to environmental changes such as the uniformity of fields through the removal of rock clusters, the smoothing of topography and the removal of field boundaries. Aligned to this is the construction of large sheds for either seasonal or increasingly year-round housing of cattle. Much of this lost diversity within the GSA Biosphere landscape has significant impacts on biodiversity and landscape character around local communities and is impossible to replicate. The intensive dairy farming also has additional social impacts with smaller traditional farms losing out to larger organisations.

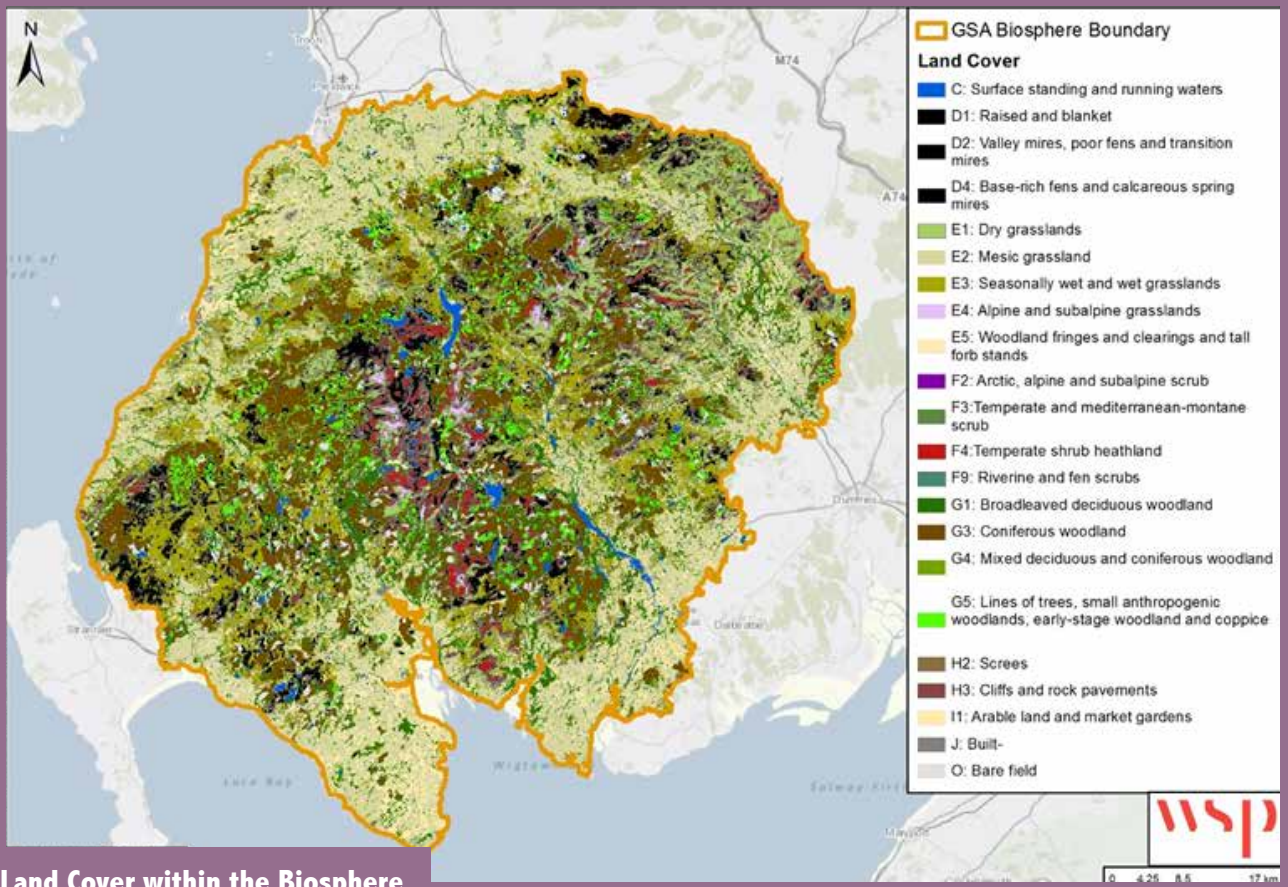
The growth of coniferous plantations and the impact from the intensification of dairy were both aspects that were raised by stakeholders during the consultation process:

"The intensification and growth of dairy farming is one of the biggest drivers of change in the Biosphere at the moment. The changes in fields and removal of rock clusters etc is changing the Biosphere. "

Attendee at the Land Use workshop

The geography of the terrestrial area ranges from the remote uplands and lowlands of the Galloway Hills to the cliff tops and beaches of the Solway coastline. The most recent land cover map for the whole extent of the GSA Biosphere is the Land Cover Map of Scotland (2020). This dataset is the best currently available albeit expected to contain some inaccuracies due to the dynamic nature of land use within the Biosphere. During the consultation process stakeholders raised that they perceived the proportion of the GSA Biosphere currently forested to be higher than was presented in the Land Cover Map of Scotland (2020).

The Land Cover maps shows that the most common habitat with the GSA Biosphere was mesic permanent pasture grassland covering 123,960ha (23% of the GSA Biosphere). Coniferous woodland and seasonally wet grassland were the second most common habitats covering 19% and 14% of the GSA Biosphere respectively. The remaining proportion of the GSA Biosphere is predominately split between other grassland types (10%), blanket bogs (8%) and broadleaved woodland (7%). Arable land was estimated to occupy 5% of the total area while only 1% was categorised as built up or urban.



Land Cover within the Biosphere

DESIGNATED SITES

National and international designations are given to sites that are important for nature conservation. Several of these wider designations mean that sites are protected under European or UK law. The importance of the Galloway and Southern Ayrshire Biosphere in conserving and enhancing the natural environment is clear from the number of designated sites included within the Biosphere.

The Core area of the GSA Biosphere comprises three key sites:

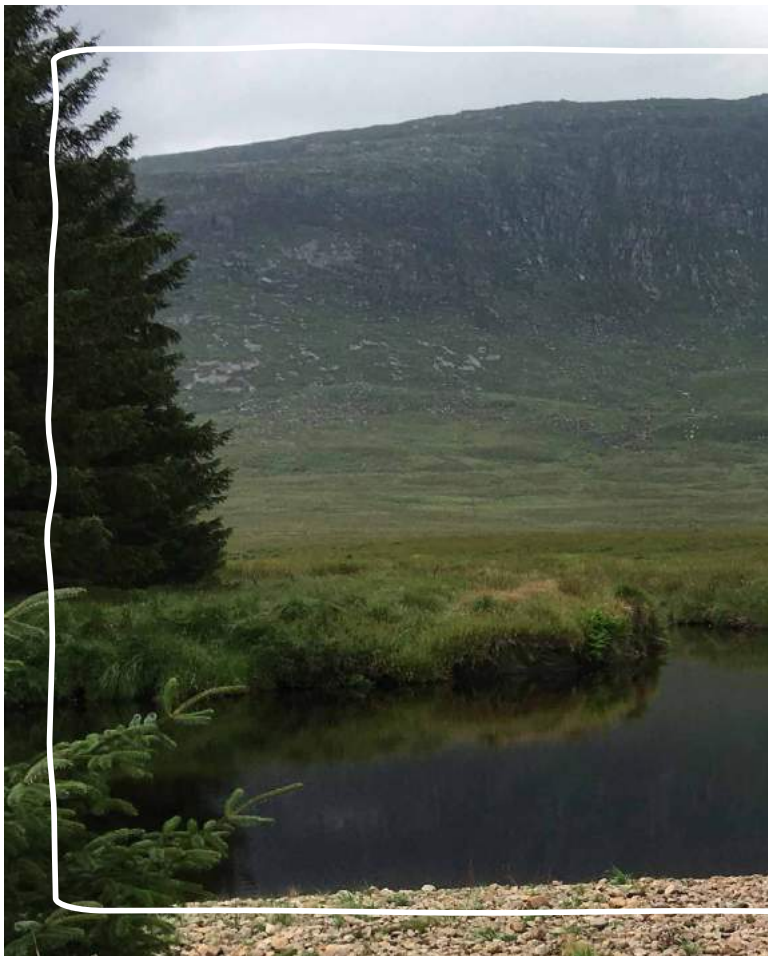
Silver Flowe RAMSAR which is a unique bog formation and one of the least interrupted undisturbed mire systems in Europe. Its high value is principally due to the landscape pattern of small lakes and open water alongside vegetated areas, the classic manifestation of mire patterned ground. It is also a breeding site for the rare Azure Hawker dragonfly.

Merrick Kells SAC contains three habitats of European interest; blanket bog, montane acid grasslands, and wet heath with cross-leaved heath. There are mires supporting various plant communities, and the area has a wide variety of species. There are nationally important breeding bird populations, and important invertebrate populations. The site is part of the largest remaining unafforested area of upland in southwest Scotland.

Cairnsmore of Fleet NNR is representative of an unafforested granite massif, relatively low-level moorland, montane grassland, and dwarf shrub heath. It is the most extensive area of open moorland in Galloway. The National Nature Reserve (which covers part of the more extensive SSSI) contains plants at their northern and western limits, nationally scarce plants, breeding upland birds, mammals and invertebrates of interest, and upland raptors. There is also a population of red deer and wild goats.

There are a total of 13 SACs found within the Biosphere, including the core area of Merrick Kells. They are also located across the buffer and transition zones. The latest condition data show that there were 32 different features for designation across the 13 sites. Over the 10-year reporting period the Airds Moss SAC was shown to be in decline whilst four sites were shown to have gone through a positive change including Kirkcowan flow SAC and Upper Nithsdale Woods SAC.

There are three Special Protection Areas (SPAs) found within the Biosphere. These are all located within the transition zone. They are designated for their importance in supporting endangered bird species such as the hen harrier and the short-eared owl. Only one site was shown to have changed condition across the 10-year period with the Muirkirk and North Lowther Uplands changing to an unfavourable condition. This was likely attributed to the change in climate towards cooler, wetter springs negatively impacting upon breeding success of Golden plover.



Fleet Valley National Scenic Area is one of three nationally important landscapes designated in Dumfries and Galloway. They are an important asset being of substantial economic value and of great importance to quality of life. The Special Qualities for which it has been designated have been identified, and a Management Strategy provides guidance to ensure the area retains its special qualities. National Scenic Areas are protected through Planning Policy.

Merrick Wild Land Area has been identified as nationally important by NatureScot for its specific wild land character. It is very sensitive to any form of intrusive human activity and therefore has little or no capacity to accept new development and is protected through Planning Policy.

There are 96 Sites of Special Scientific Interest (SSSIs) within the Biosphere. In Scotland these sites are designated by NatureScot under the Nature Conservation (Scotland) Act 2004 and help to conserve and protect the best of Scotland's wildlife, geological and physiographical heritage for the benefit of present and future generations.

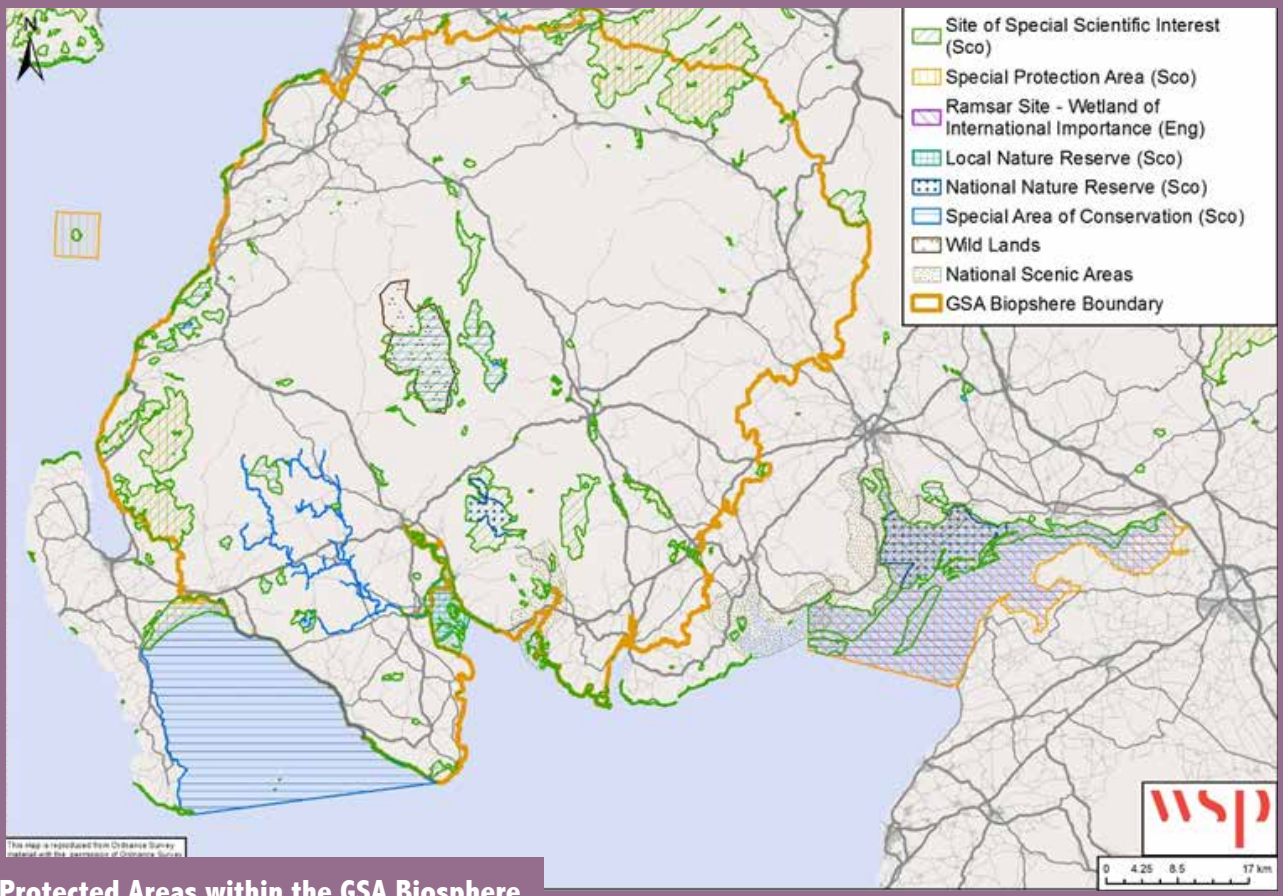
Many are also classified as SACs or SPAs. Land within SSSIs is protected from development and all SSSI's in Scotland have management plans to ensure consistent, favourable long-term management of these sites. Periodically, the condition of SSSI's is assessed to measure progress against targets to improve the habitats within these sites.

Of the SSSI's within the Biosphere, 30 sites (i.e., 31%) were shown to have improved over the 10-year period, with 19 undergoing a negative change and one site. Of the sites in decline the impacts from adjacent forestry plantations and agricultural lands were predominately listed as the likely cause. The impact of climate change on species behaviours was also a notable factor.

In addition, there are two Ramsar Sites (internationally designated rare or unique wetland areas) located within the Biosphere, one within the core zone (Silver Flowe) and one within the transition zone (Loch Ken and River Dee Marshes). The Loch Ken and River Dee Marshes is assessed as showing favourable condition changes over the last 10 years whilst the Silver Flowe is considered to be recovering due to the extensive peatland restoration that has taken place on the site.

The Cairnsmore of Fleet National Nature Reserve is found within the core zone of the GSA Biosphere and includes one of the most southerly of the Galloway Hills and overlaps with the Cairnsmore of Fleet Site of Special Scientific Interest.

Local Nature Reserves (LNRs) are areas of natural heritage that are locally important, designated and managed by local authorities. The purpose of LNRs is not only to protect habitats and wildlife but to increase people's awareness of the natural environment. The Wigtown Bay LNR is found on the edge of the transition zone of the GSA Biosphere and is the largest LNR in the UK.



Protected Areas within the GSA Biosphere

KEY HABITATS & SPECIES

The GSA Biosphere contains a stunning diversity of habitats that span upland landscapes, native woodlands and coastal features.

There are many legally protected and nationally rare, scarce or notable species found within the area. The two Local Biodiversity Action Plans (LBAP) covering the area identify over 300 species of local importance.

The Biosphere has taken a habitat-based approach promoting the management of land in a way that helps to support the protection, enhancement and restoration of habitats that will benefit key species, whilst at the same time enhancing the wider natural environment which, in turn, will also benefit humanity. High Focus Species and Habitats were identified in 2012 through a thorough public engagement process. These species and habitats are of particular value and / or decline in the GSA Biosphere and conservation efforts and initiatives are targeted towards these priorities.

In 2018 the GSA Biosphere Partnership Board published the Natural Heritage Management Plan which highlighted the habitats and species considered to be of particular importance in the Biosphere and sets out their current status, requirements for their conservation, causes of their decline and possible solutions to consider. It was designed to support land managers across the Biosphere in creating suitable management plans. It is envisaged that it will be revised on a cyclical basis, with the example projects updated more regularly and made available on the Galloway and Southern Ayrshire Biosphere website. The outcome of the Natural Heritage Management plan is shown below.

High Focus Habitats

Nine High Focus Habitats were identified within the Core and Buffer areas in 2012. The update to the National Heritage Management Plan in 2018 identified an additional 5 habitats within the transition area as well. This included:

- Blanket bog and Raised bog
- Upland heathland
- Purple moor grass and rush pasture
- Montane heath and montane scrub (latter is an aspirational habitat)
- Native upland oak woodland and Wet woodland
- Acid grassland
- Oligotrophic lochs
- Woodland fringe for Black grouse
- Woodlands for Red squirrel
- Fresh water habitats
- Coastal Habitats for curlew

Other habitats important for some High Focus Species

In addition to the High Focus Habitats there are habitats that are important for the identified High Focus Species.

- Moorland Fringe (for Black Grouse)
- Woodlands (for Red Squirrel)
- Fresh Water Habitats (for Water Vole and Brown Trout)
- Upland Heathland (for Golden Eagle)
- Fresh Water

Blanket and Raised Bog

Blanket and raised bogs are recognised internationally as important habitats and for their role in mitigating climate change. Bogs are formed from the accumulation of peat, produced from the slow decay and compression of organic matter, making peat soils the largest single store of carbon in the UK. For centuries peatlands have been degraded with management focused on farming, forestry, field sports, and more recently for windfarm developments. Some of the associated management practices have been detrimental, with draining, over-grazing, burning and planting for forestry significantly altering their hydrology and vegetation, which in some instances has led to erosion, peat loss and increases in greenhouse gas emissions.

The condition of blanket bogs in the Biosphere is only systematically recorded for blanket bogs found within the designated sites (e.g., Merrick Kells SAC and SSSI, Silver Flowe Ramsar site, Cairnsmore of Fleet NNR and SSSI) and ranges from unfavourable declining to unfavourable recovering. Only a small area of (lowland) raised bog was recorded within the Core and Buffer zone so the greatest opportunity for improved data and management of this habitat is in the Transition Zone.

Restoring the existing areas of blanket bogs within the Biosphere should be achieved through agri-environment schemes and engaging with landowners over management techniques. Key methods include the removal of existing drainage to raise water levels and reducing the grazing intensity of livestock. The East Ayrshire Coalfield Environment Initiative to restore blanket bogs in East Ayrshire is discussed within the ecosystem services section.

Fresh water

Watercourses and waterbodies form a significant part of the Biosphere ecosystem, with the boundaries of the Biosphere being largely based on the catchment of river systems radiating out from the Core areas. These include: the Water of Girvan, and the rivers Doon, Stinchar, Nith, Dee, Fleet, Bladnoch, Cree and Urr, plus numerous smaller coastal rivers.

The watercourses within the Biosphere range from high-energy upland burns to slower flowing, wider bodied, meandering river sections nearing the coast. They form habitats which support a wide range of other species including High Focus Species like Atlantic Salmon, Brown and Sea Trout, Water Vole, Otter and various species of bats, and many birds such as Kingfisher, Moorhen, Sand Martin and wintering wildfowl.

The condition of the water environment in the Biosphere is assessed by the Scottish Environment Protection Agency (SEPA) and published annually via the Water Classification Hub, with targets for improvement measures agreed and published as part of the Scottish river basin plans. The water environment of the GSA Biosphere falls within both the Scotland and Solway Tweed river basin plans.

There are now 8 water bodies classed as in bad condition, which is an improvement from the 11 reported in the river basin plans in 2014. These are found in the Doon, Cree and Dee systems and at the Galloway coast.

The pressures are identified as (in order of number of waterbodies impacted):

- Fish barriers -highest as one barrier can impact all of waterbodies upstream;
- Physical condition alterations like straightening and dredging;
- Acid rain impacts;
- Rural diffuse pollution;
- INNS - linked to presence of American signal crayfish;
- Change to water flows and levels and the presence of dams to support hydro-electric generation.

Each pressure type has a programme of actions to deliver to improvements by 2027 and SEPA works across the Biosphere with a variety of partners to maintain and enhance the condition of the water environment. There is a programme of fish barrier scoping and easements for historic, active and asset barriers and to tackle diffuse pollution Priority Catchment receive a special focus on compliance of General Binding Rules, with additional requirements in Nitrate Vulnerable Zones in the Nith and lowland Stranraer. The continued influence of acidification is being monitored and tackled through partnership working with Forestry, Galloway Fishery Trust and Peatland restoration programmes. Loch Ken is the focus of biosecurity measures to contain the spread of American signal crayfish and there is continued work with the Hydro sector to determine feasible improvements in the catchments impacted by electricity generation. Finally, Water Environment Fund, and other sources, are restoring rivers to a more natural physical condition – stretches in the Nith are being tackled with options being explored on the Nith and in Stranraer.

Coastal habitats

The Biosphere includes 280km of coastline to the south and west, most of which is highly scenic and contains valuable habitats including: Coastal Cliffs and Slopes, Coastal Saltmarshes (Merse) and Coastal Sand Dunes, which, by their nature, create unique habitats suitable for pioneer and specialised plants. The Coastal SSSI sites across the Biosphere include: Borgue Coast, the Cree Estuary, Girvan to Ballantrae (Girvan Mains to Turnberry Castle, Turnberry Dunes) and Maidens to Doonfoot.

Although no quantitative data is available it is anticipated that coastal habitats within the GSA Biosphere are currently experiencing higher levels of negative pressure than ever before. This is due to a combination of environmental and human driver factors.

The impact of sea level rise is leading to a situation known as coastal squeeze where environments such as a salt marsh are permanently flooded, and coastal defences prevent new areas from flooding. This is leading to a loss in the total area of coastal habitat across the UK coast and within the Biosphere. In addition, the overall quality of the coastal habitats is being degraded due to human caused factors such as plastic pollution. These are causing disruption to the health of coastal ecosystem particularly those near where pollution accumulates such as in urban areas.

Woodland and forests

Forest plantations and woodland areas within the GSA Biosphere support a diverse array of species.

The commercial plantations support a lower diversity of species than the native broadleaves, but nonetheless have populations of important species such as nightjar, goshawk, red squirrel and pine marten. The native broadleaved woodlands, especially those classified as Western Atlantic Oakwoods, support significant populations of important species including pied flycatcher, common redstart, wood warbler, willow tit, various bat species, and many invertebrate and plant species. Red and roe deer, water voles and otters are also found within the forests and woodlands.

Woodland habitats including broadleaved deciduous woodland, coniferous woodland, mixed woodland and small anthropogenic woodlands, cover 137,965 ha and 26% of land cover within the Biosphere. The majority of the woodland within the Biosphere is coniferous forest which was estimated to cover 18% of the total area in 2020 and is likely to have increased since due to forestry plantations. There are important pockets of broadband woodland within the Biosphere which include communities such as the western Atlantic oak woodland. The groups of these species present in the west of the GSA Biosphere have in recent years been found to support a broad assemblage of bryophytes and lichens. However intensive plantations support a smaller array of species.

In the areas of natural woodlands good management for conservation generally aims towards maintaining a good diversity of species, sizes and age classes of trees and shrubs, encouraging diversity in the structure and species composition of the ground vegetation, maintaining rich bryophyte and lichen assemblages on rocks and trees, maintaining good quantities of standing and fallen dead wood, and controlling the extent and spread of non-native trees and shrubs, especially Rhododendron ponticum.

The GSA Biosphere has seen a sharp increase in the amount of forestry present over the 10-year review period. The Scottish Forestry spatial data estimates that 5,221 hectares of woodland planting have taken place under woodland plantation grant schemes since 2012. The Schemes include those under the Rural Development Contracts contract scheme which ran from 2007-2013 and the Forestry Grant Schemes which was introduced in 2015. The breakdown of the total area planted each year is provided in the table below. This shows that the rate of woodland planting has increased dramatically since the introduction of the Forestry Grant Scheme in 2016.

Of this area 4,228 hectares (85%) were recorded as being planted with coniferous species such as Sitka Spruce and Norway Spruce. Only 143 hectares of the recently planted conifers were considered diverse within the datasets i.e., used coniferous species other than Sitka Spruce.

Only 515 hectares of woodland planted under the woodland creation grants from 2012 - 2020 have included native broadleaved species. As shown in the table the proportion of woodland creation has increased annually from 2012.

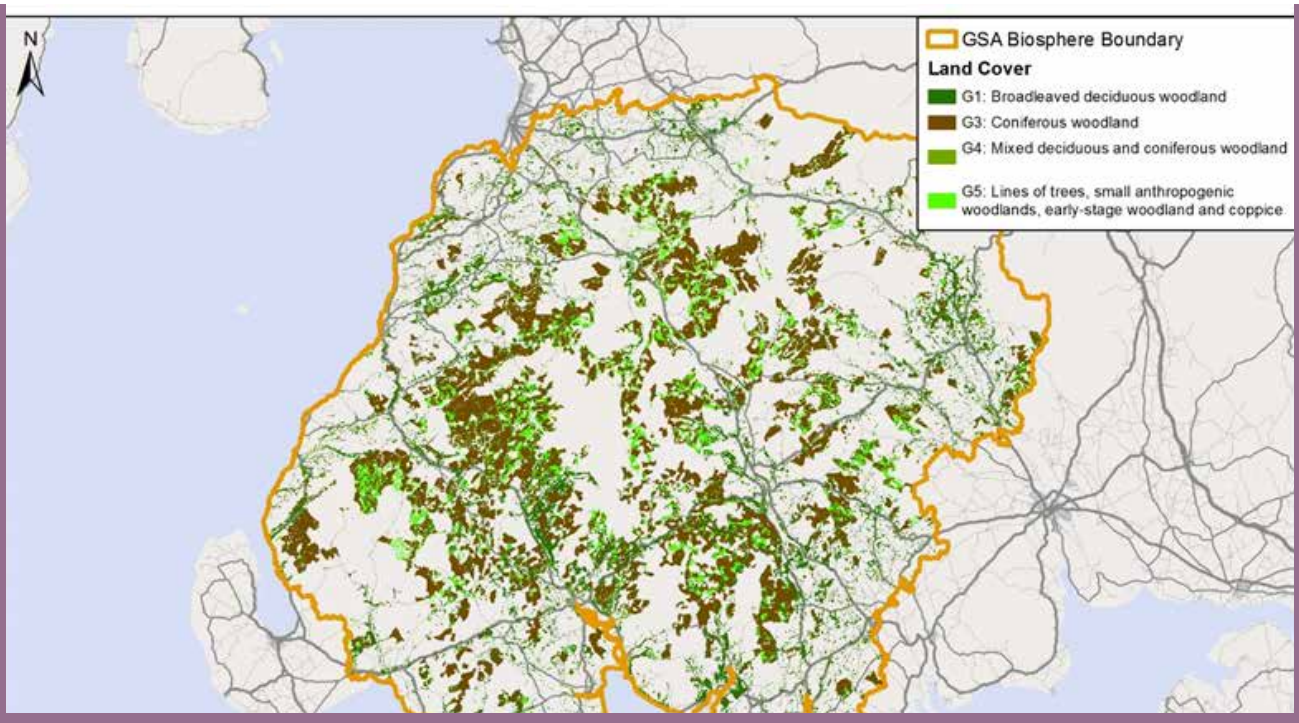
Woodland planting by year

Year of planting	Area (ha)
2012	399
2013	136
2014	243
2015	220
2016	504
2017	563
2018	874
2019	897
2020	1385

The impact of woodland creation was cited as one the most significant changes within the GSA Biosphere by stakeholders. This land use has led to significant impacts on the landscape of the Biosphere by changing existing views and creating artificial woodland blocks. The acidification from the woodland has a negative impact on water course quality throughout the GSA Biosphere as detailed within the Scottish Environment Agency's Water Classification hub.

A major social impact from the increase in plantation forestry is the pressure it is placing on rural farming communities by increasing land prices. The demand for additional land to meet the timber sector's needs and national net zero agenda are causing rural farmland to be sold at often inflated prices. This inflation is preventing younger farmers from purchasing land and causing families to leave traditional rural communities. These social impacts were one of the most common themes raised during the stakeholder workshops and through the online survey.

The plantation woodlands are typically managed on a more commercial basis, but there is still scope for maintaining at least a reasonable level of ecological interest, for example through managing some stands under a continuous cover regime in which overshading and large-scale clear-felling are avoided. Monocultures are particularly vulnerable to tree disease, particularly Phytophthera ramorum on larch, and fire risk in the increasingly frequent drought periods.



Woodland across the GSA Biosphere

High Focus Species

A total of nine High Focus Species have been identified within the Biosphere and include four bird species, two mammal species, one species of fish and two vascular plant species.

- Black grouse
- Golden eagle
- Curlew
- Golden plover
- Red squirrel
- Water vole
- Brown trout
- Juniper
- Downy willow

The Black Grouse Habitat Creation Project between Galloway Glens, RSPB and Forestry and Land Scotland has focused on creating and enhancing habitat for Black Grouse and on promotion of the species and its habitat to key land managers, local people and visitors. Targeted restructuring and enhanced management now offer the opportunity to benefit this important species. Lessons learnt from this initiative are now being used to develop a wider Southern Scotland Black Grouse initiative including the Biosphere and other key stakeholders.

Black grouse

Black Grouse (Tetrao tetrix) is a UK Biodiversity Action Plan priority species and species listed on the Annex II/2 of the European Birds Directive. It is currently listed as Red in the Birds of Conservation Concern (BoCC). Historically, Dumfries and Galloway held a significant proportion of the black grouse population in Scotland. In recent decades, there has been a huge reduction in numbers due to loss of moorland habitat to mature forestry and over grazing of remaining moorland.

Combined with other factors, such as collisions with fences and predation, the remaining populations have become fragmented and isolated. Black grouse declined by 29% between the two national surveys in 1995/96 and 2005, but this decline was even more pronounced in southwest Scotland with a decline of 49%. The population in southern Scotland is now vulnerable to extinction with just over 200 lekking males recorded in 2021 and the population now isolated from birds to the north of Scotland and to the south in England.

The curlew

The Eurasian Curlew (Numenius arquata) is a UK Biodiversity Action Plan priority species listed on the Annex II/2 of the European Birds Directive, is red listed in the latest BoCC and the IUCN 2015 Red list. The population in the United Kingdom has undergone a 62% decline over the period 1970-2012, and a 46% decline over the period 1995-2013, (Hayhow et al. 2014).

The curlew is the largest wading bird in Europe and utilises different habitats throughout the year. During the breeding season, curlew inhabit heathland, purple moor grass grasslands, bogs, fens and rush pastures as well as agriculture grasslands with a suitable vegetation structure. During the winter season, curlew typically inhabit coastal regions on mudflats, saltmarshes and coastal grasslands and feed on insects as well as crustaceans and molluscs. Loss of breeding and overwintering habitat, afforestation and intensive agriculture as well as predation of nesting chicks are serious threats.

In recognition of the global importance of the UK's curlew population and its current decline, the RSPB has identified the species as one of their highest priorities for action in the UK. Within the Biosphere the society manages Barclye, part of the Wood of Cree nature reserve, in an effort to maintain breeding curlew and, along with black grouse, the species is a focus for targeted advice in upper Nithsdale and parts of East Ayrshire, which still hold significant populations. The RSPB also had a trial management project underway on and around their reserve at Airds Moss which finished in 2020.

Golden plover

Golden plover (Pluvialis apricaria) is a species listed on Annex I of the European Birds Directive and also currently listed on the amber, listed on the green in the latest of birds of conservation concernBoCC. The population for golden plover in the UK declined by 25% between 1995 and 2013, but there has been a more recent recovery.

The distribution of golden plover within the Biosphere is likely to be limited to the uplands, particularly of the of the Core and Buffer zones during the summer breeding season. During the winter months they move to both the Solway and Ayrshire coast. The current status of the population in the Biosphere is not well understood as the species is not well recorded.

Red squirrel

The red squirrel (Sciurus vulgaris) is a UK Biodiversity Action Plan priority species and a species listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Red squirrel is a native squirrel species associated with woodland habitats. Unlike the non-native grey squirrel, the red squirrel can be found in large tracts of coniferous forest as well as broadleaved woodlands.

Red squirrels are found throughout the Biosphere but the forests supporting red squirrels within the Buffer zone around New Galloway, Laurieston and the southern end of the Galloway Forest Park have been identified as the priority area for grey squirrel control in the Scottish Strategy for Red 30.

The Nith catchment has been identified as a priority for grey squirrel control as well as a small discrete area around Maybole. Forestry and Land Scotland has an ongoing programme of extensive monitoring for grey squirrel presence, testing for squirrel pox virus and grey squirrel control.

Water vole

Water vole (Arvicola amphibius) is a UK Biodiversity Action Plan priority species and a species listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Its population has suffered a dramatic decline in the second half of the 20th century in Britain due to habitat degradation and fragmentation and predation by introduced American mink. It is a species associated with freshwater streams in both lowland and upland environments. Water voles are the largest of the British voles and the Scottish water vole is genetically distinct from those in the rest of the UK. The GSA Biosphere engages with developers and encourages major development projects, such as wind farms, to include habitat management plans for water vole.

Water Vole Training – Case Study

In 2016 Biosphere officers working in partnership with the local biological records centre ran a programme of training for local people to take part in surveying of water voles within the Biosphere area. The surveys focussed on areas with positive historic records of water voles and the identifying evidence that would indicate areas where they were still active. Twenty people took part in the training going on to survey burns and ditches across the Biosphere area that helped to provide evidence of notable populations in some areas.

Golden eagle

Golden eagle (Aquila chrysaetos) is an upland bird species and the second largest bird of prey in the UK. While historically found throughout the uplands, golden eagle populations have declined due to loss of habitat and persecution, with current distribution in the UK restricted to Scotland. Within the Biosphere, the population has declined from four breeding pairs in 1980 to two breeding pairs in 2015, due primarily to loss of open ground and moorland habitat to coniferous afforestation.

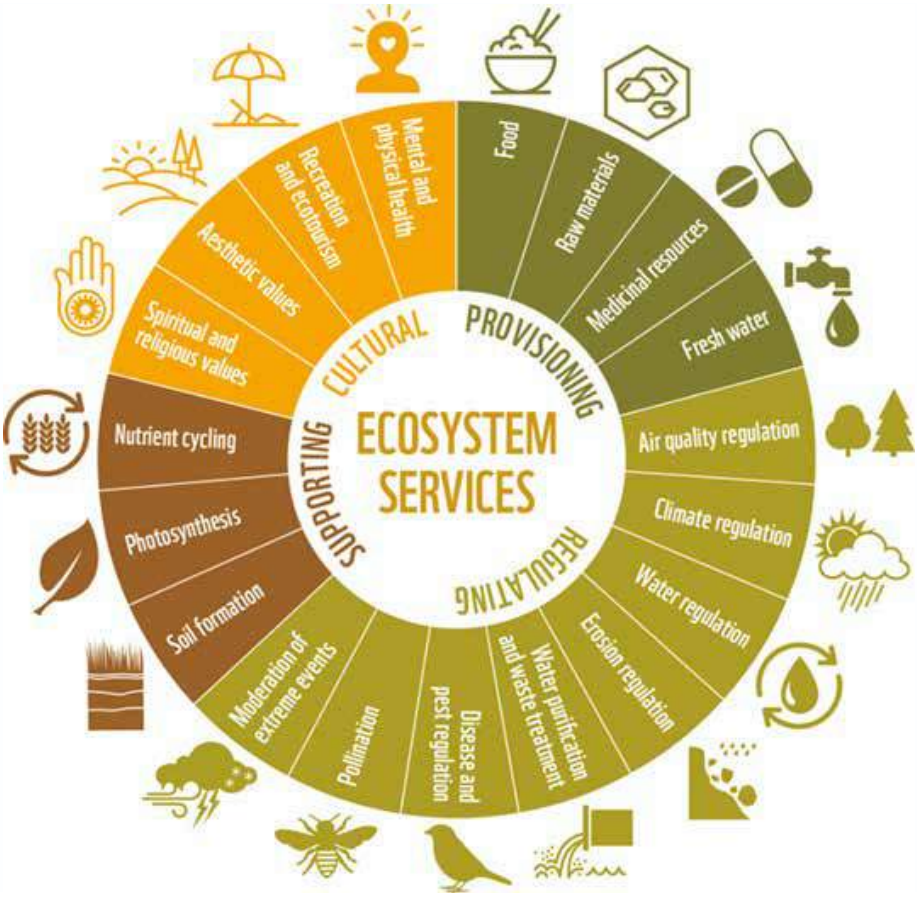
Golden eagle requires large expanses of open ground where there are abundant prey and suitable locations for nesting, such as crags or trees. Golden eagles are territorial and defend their territory, the core part of their home range. Home ranges must be large enough to sustain a breeding pair and their young. Golden eagles are also slow breeders, and their breeding success rate is often low.

There is an ongoing collaborative effort under the South of Scotland Golden Eagle Project which is led by Southern Uplands Partnership and includes Scottish Forestry and the Scottish Raptor Study Groups (South-West Scotland Groups) to protect and monitor the resident breeding pairs. During the breeding season, nest sites are under surveillance and feathers are submitted to Natural Research DNA project. The project is aiming to reinforce the small, isolated and vulnerable population of Golden Eagles in the Scottish Borders and Dumfries & Galloway.

ECOSYSTEM SERVICES

"A healthy and resilient natural environment ensures that future generations can enjoy the same quality of life that we do today."

The natural environment provides us with many benefits through what are often referred to as "ecosystem services". These services include the provision of food, fresh water, wood, fibre and fuel as well as regulation of climate, flooding, pests and diseases and educational and recreational opportunities. Through these services, the natural environment contributes tangible benefits to the economy, society and individual health and well-being.



The habitats and landscapes present in GSA Biosphere provide a range of important ecosystem services to those living in and around the region. The peatlands and woodland in the uplands and lowland areas of the Biosphere (such as the blanket bog of Merrick Kells), provide significant carbon storage which helps mitigate against the effects of climate change. The peatland and bogs also provide water purification by reducing the concentration of nutrients (nitrates, nitrites and dissolved phosphorus) and pollutants (such as metals) in waterbodies and organisms downstream along with educational, scientific and cultural benefits. The provision of food was consistently listed as an important ecosystem service to rural communities during the stakeholder engagement workshops.

Throughout the 10 years of its designation the Biosphere Partnership Board has worked to raise awareness about what the designation offers the area in relation to economic development, research and ecological management and enhancement. The Partnership has the desire to embed the ecosystems approach in the development of the Biosphere.

In 2013, to gain a great understanding of the ecosystem services within the Biosphere an Ecosystem Services Mapping Study was undertaken. This work built on an earlier methodology of mapping ecosystem services using datasets to model natural resources and ecosystem services. The mapping aimed to inform stakeholders about the often-hidden value of their environment and to help provide evidence for decision making using a holistic and integrated approach to managing the Biosphere.

As part of this Biosphere periodic review, a review of the original ecosystem services mapping exercise was undertaken alongside engagement with stakeholders and a review of land use information to explore where changes have occurred. The responses showed that food production (from agriculture) and other services such as climate regulation, water flow regulation, cultural heritage and identity, the aesthetic beauty of the landscape, sense of place and tourism and recreation were considered the most important. The results of the Ecosystem Services review are shown below:

Table 1: Ecosystem Services Assessment

Ecosystem Service	Provided	Beneficiaries of ES			Importance of ES		Change in ES	
		Within the site	Adjacent to the site	Distant from the site	Most important services	Additional detail on the ES, beneficiaries and/or importance	Change in past 10 yrs [arrows]	Additional detail on changes
Provisioning services								
Food	✓	✓	✓	✓	★	Farms provide food but also other services through agri-environmental schemes. Important sector for rural communities that depend on services for income.	⇧	Increase in the amount of intensive agriculture. Increased demand for local produce.
Timber and other raw products	✓			✓		Timber is produced but majority of the benefits received externally to the Biosphere.	⇧	The amount of timber production within the Biosphere has increased over the previous 10 years.
Biomass fuel / renewable energy	✓							More renewable energy and local interest in this
Fresh water	✓	✓		✓				
Genetic material	✓					Conservation projects contributes to preserving the genetic pool for protected species.	⇧	Increase in the quantity and success of conversation schemes leading to increased numbers of protected species such as Golden eagle.
Biochemical and medicinal resources	✓	✓	✓	✓				
Regulating services								
Air-quality regulation	✓	✓	✓	✓		Local air quality is good, presence of lichens as indicator		
Climate regulation	✓	✓	✓	✓	★	Increased awareness of the role of habitats in regulating climate.	⇧	Work by peatland action leading to increased peatland restoration and carbon sequestration.
Water-flow regulation	✓	✓			★		⇔	
Erosion regulation	✓	✓						

Ecosystem Service	Provided	Beneficiaries of ES			Importance of ES		Change in ES	
		Within the site	Adjacent to the site	Distant from the site	Most important services	Additional detail on the ES, beneficiaries and/or importance	Change in past 10 yrs [arrows]	Additional detail on changes
Regulating services								
Water purification /waste treatment	✓	✓				Water quality is affected by acidification of forestry plantations. This is regularly monitored for the WFD		
Disease regulation	✓							
Pest regulation	✓							
Pollination	✓					Diversity of habitats available including semi-natural grassland and woodlands for flower and tree pollen. Increase in organic farms and gardens.		
Natural hazard mitigation	✓							
Cultural services								
Cultural identity and heritage	✓	✓			★		⇔	The GSAB has always been important for culture and heritage.
Spirituality and religion	✓	✓						
Knowledge systems and education	✓	✓	✓	✓				
Cognitive development, health, wellbeing	✓	✓						
Aesthetic experience	✓	✓			★	The diversity of the landscape in the GSAB provide a unique aesthetic setting.		
Inspiration for human creative thought and work	✓	✓	✓	✓		Festivals relating to Food and culture. Creative community, people moving to area share this interest.	⇧	Recently increase in festivals and events around
Recreation, ecotourism	✓	✓	✓	✓	★	Tourism becoming an increasingly important sector within the Biosphere.	⇧	Increase in Green tourism, Cycling, Dark skies park attraction due to the SSDO and DMMO.
Sense of place	✓	✓			★			

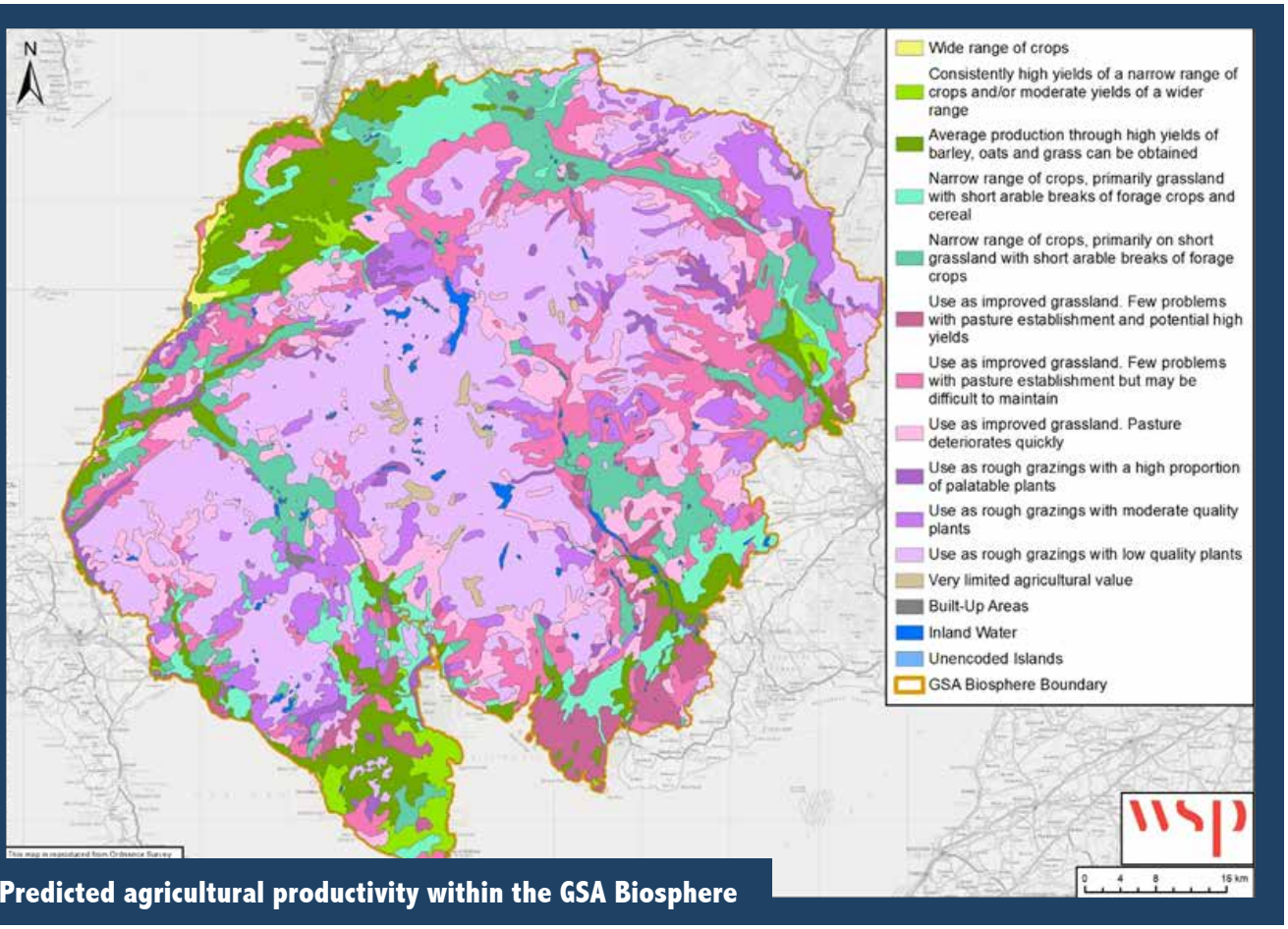
PROVISIONING SERVICES

Provisioning services are the products directly obtained from ecosystems (e.g., food, fibre, timber).

Agricultural production

Agricultural production is an important ecosystem service within the Biosphere that provides a livelihood to many rural communities. The services rely on a range of supporting services provided by a range of types and locations of land. The end product from agricultural production provides a primary source of income for many people in the Biosphere. The outputs of the agricultural production are used in the Biosphere and across Scotland.

As shown below the core of the biosphere is classified as only capable of use as rough grazing with low quality plants. The southwest near Castle Douglas is considered suitable for arable production with land classified as capable of producing consistently high yields of a narrow range of crops and/ or moderate yields of a wider range and Land capable of producing a narrow range of crops, primarily grassland. The Biosphere is considered highly suitable for dairy and beef farms with some of the highest number of beef cattle outside of Grampian and Dumfries and Galloway holding close to 50% of all the dairy cattle in the whole of Scotland.



Predicted agricultural productivity within the GSA Biosphere

Timber production

Timber production is a one of the largest land-based industries in the Biosphere with coniferous forest estimated to occupy round 19% of the land cover. Timber production is based around the growth of coniferous timber plantations that are planted in dense monocultures and felled for timber on a 30-to-60-year rotational cycle. The GSA Biosphere has been recognised as one of the most productive areas with Scotland for the growth of coniferous plantations due to the climate conditions. This has led to an increase in the quantity of timber production within the Biosphere over the period of 2012 – 2022.

Forestry provides additional ecosystem services with carbon sequestered by the growing trees contributing to climate regulation however it is known to have a detrimental impact on other services such as water quality, certain aspects of biodiversity and food production. The land use change associated with replacement of agricultural land to timber plantations also has a significant impact on the cultural services within the GSA Biosphere such as residents' sense of place and the appeal of the region for tourism.

Case study: Land Energy 2019

Girvan-based biomass fuel company Land Energy is the largest enterprise in south-west Scotland to have been awarded the Biosphere Certification Mark. The company processes 200,000 tonnes of wood each year using up wood which doesn't make the grade at sawmills and taking brash from forest floors that would otherwise be left in situ where it would release carbon dioxide and methane as it decomposed. Before Land Energy began removing this from Galloway Forest around 30% of felled wood would remain on the forest floor. In terms of its own energy use the Girvan plant is virtually self-sufficient: now generating almost all its power and heat on-site it is thus 'decoupled' from fossil fuels. With this sustainable supply at its very door, haulage distance averages less than fifty miles.

"Becoming an active part of the GSA Biosphere makes sense to us on all levels. As a business we realise that our employees, supply chain, and support infrastructure is almost entirely sourced from the biosphere and immediate surrounding areas. We are part of the ecosystem that benefits from – and contributes to – the human, natural and cultural capital of the area." Hugh Montgomery, Associate Director, Land Energy

REGULATING SERVICES

Regulating services are the benefits obtained from the regulation of ecosystem processes (e.g., climate regulation, flood risk reduction, water purification and treatment).

Climate regulation

Carbon storage from habitats is an important ecosystem service which helps counteract the effects of climate change, by absorbing carbon dioxide from the atmosphere and preventing the release of carbon from the land.

The GSA Biosphere contains large areas of carbon storing habitats such as the woodland areas and peatlands. Work is being undertaken within the Biosphere to increase the quantity of carbon stored within habitats by restoring peatland and managing woodland sustainably.

Case study: Restoring Peat Bogs in East Ayrshire 2017

The Coalfield Environment Initiative and Scottish Wildlife Trust re-wetting of Dalmellington Moss Wildlife Reserve was funded by Peatland Action and the Heritage Lottery Fund. Low Moss and Dalmellington Moss had been drained and burned in the past to dry out the bog for agricultural grazing. Over time this had degraded the habitat, resulting in fewer peatland plants in favour of grasses and scrub. Coalfield Environment Initiative staff worked with the site owners' Hargreaves (Low Moss) and the Scottish Wildlife Trust (Dalmellington Moss) to come up with restoration plans and to carry out the work needed to improve the bog habitat.

Work entailed constructing a trench bund and repair to existing plastic piling dams to slow water loss and scrub removal. The aim was to stop carbon loss to address climate change and help to reduce local flash flooding. The site is now monitored using fixed vegetation quadrats and automatic data loggers to record the height of the water table.

Water quality

The habitats and land use surrounding watercourses play an important role in reducing the quantity of pollutants and chemicals that enter the water course and impact on its water quality which can affect environmental and human health. The intensification of agriculture within the Biosphere and the acidification from woodland plantations is placing increased pressure on water quality within the Biosphere.

CULTURAL SERVICES

Cultural services are the non-material benefits people obtain from ecosystems (e.g., aesthetic inspiration, cultural identity, sense of place, and spiritual experience related to the natural environment).

Tourism and recreation

The Biosphere is an important tourism destination that includes Galloway Forest Park, designated as Europe's first gold tier Dark Sky Park in 2009. With just over 900,000 visitors per annum, tourism provide an important contribution to the livelihoods of many communities and helps to increase awareness of the Biosphere nationally and internationally.

The GSA Partnership is keen to promote sustainable tourism across the Biosphere. A sustainable tourism business fulfils economic, environmental and socio-cultural obligations while generating income, contributing to employment, maintaining cultural integrity, and preserving essential ecological processes and biological diversity. Broadly speaking, sustainable tourism is that which aims to enhance the quality and sustainability of natural and cultural heritage-based experiences. There are likely to be significant opportunities for those visitor attractions, restaurants and accommodation providers which decide to focus on sustainable tourism initiatives.

The GSA Biosphere provides businesses with opportunities to promote their sustainable tourism credentials through the use of the GSA Biosphere brand and marketing. It enables businesses and communities to associate themselves with the international banner of being part of a UNESCO Biosphere and guide them on their journey towards operating sustainably through events such as the "Biosphere – Good for Business Event January 2020".

Adventure Centre for Education – ACE

ACE is a social enterprise and Biosphere Certified business in Girvan, South Ayrshire with charitable status and is governed by a voluntary Board of Trustees. Its work is based around using adventure activities as a tool for personal development and learning about the natural environment and its protection for the future. ACE presently works in partnership with over thirty organisations, developing programmes that meet the needs of its participants. ACE has had the whole of its organisation certified, which includes the adventure tourism aspect under the brand name Adventure Carrick, its community development work and its educational programmes.

ACE supports the Biosphere by raising awareness with customers and visitors that the Galloway and Southern Ayrshire Biosphere is recognised internationally as a special place for wildlife and people. The instructors mention the Biosphere as part of their activity induction when working with various groups, whether that is a school group or tourists. Partner organisations are made aware of ACE basing its activities in the Galloway and Southern Ayrshire Biosphere.

ACE is a substantial local employer. 90% of its full-time staff are all from the local community. ACE runs a trainee programme, normally offering four six-month trainee placements per year. Flexible working for employees is supported along with continued personal development for staff, offering both internal and external training to all its employees.

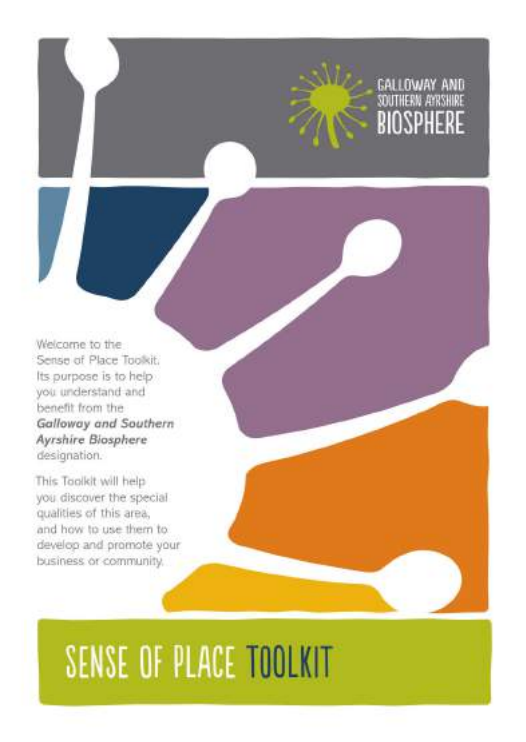
Sense of place

Sense of place is an important cultural ecosystem service which identifies the Biosphere and many of its recognised landscapes. Sense of place contributes to the culture and identities of the Biosphere's local communities. The special qualities of the Biosphere are described by many factors such as the: landscapes, wildlife, heritage, people. The work undertaken by the Biosphere such as the Sense of Place toolkit has contributed to an increased appreciation of 'sense of place' among individuals of the Biosphere.

The Sense of Place approach can help communities to get a shared understanding of the special qualities of the Biosphere and the place in which they live. The Sense of Place toolkit is used as a starting point for the process of a village becoming a Biosphere Community. It guides communities through a workshop of identifying the special places that local people like to visit, the activities they like to take part in, the local food or products they like to purchase, the things they like to see. It's a great way of identifying the unique selling points of a community under the umbrella of being a part of a UNESCO Biosphere and a 'Biosphere Community'.

Case study: The Sense of Place Toolkit

The Sense of Place Toolkit was developed by the GSA Biosphere to help business and communities recognise the special qualities of their local area and to provide guidance on how to use these qualities to develop and promote their business or community. The Sense of Place Toolkit is intended for use by everyone including community groups, businesses and organisations operating within or near to the Galloway and Southern Ayrshire Biosphere.



The toolkit explains the meaning of the term Sense of Place. It provides practical steps and advice on:

- **Creating promotional materials, such as a leaflet, a website or advertisements.**
- **Informing customers or visitors about the local area. Developing a plan, proposal or trategy**
- **Providing training to staff or colleagues**
- **Working with the community**
- **The Sense of Place toolkit aims to help deliver practical outcomes for local business and communities that will provide benefits for themselves and their customers such as:**
- **Adding value to local products and services**
- **Strengthening the identity of 'brand' of an area by encouraging different groups to work together in promoting a place and its special qualities**
- **Providing inspiration for education, interpretation and creative arts**

RESEARCH & LEARNING

Biosphere reserves are 'learning places for sustainable development' for people of all ages, where the testing and sharing of ideas or experiences regionally, nationally and internationally is integral to what we do.

A key objective of all Biospheres around the world is to support the research, piloting and sharing of new ideas and new thinking that helps create a better understanding of how we can address global issues such as climate change and loss of biodiversity whilst also supporting healthy and resilient communities and economies.

The Biosphere Partnership supports this objective by promoting and disseminating new research to better understand our environment. They have encouraged exchanges and sharing of experiences, information and good practice through learning and networking opportunities with Biospheres around the world.

The GSA Biosphere aims to be an area where interactions between social, economic and environmental interests in a region can be monitored, studied and shared with others. The Biosphere is an inspiring place for outdoor and creative learning which works towards a flourishing, sustainable world where communities value the natural environment, societies are inclusive, equitable and peaceful with a vibrant economy. The Biosphere actively promote learning for sustainability outside and in the classroom and makes resources available which can be used by schools, colleges and Universities as well as informal learning groups.

This section provides an overview of the achievements of the GSA Biosphere within research and education, provides examples of successful projects and describes the challenges that are currently being faced.

RESEARCH

The GSA Biosphere aims to be an area where interactions between social, economic, and environmental interests in a region can be monitored, studied, and shared with others. The Biosphere Partnership supports this objective by working with research groups, promoting, and disseminating new research to better understand our environment. They have encouraged exchanges and sharing of experiences, information and good practice through learning and networking opportunities with Biospheres around the world.

In 2014 the Biosphere set out its research priorities for the 2014 – 2018 period in the GSA Biosphere Research Priorities (2014-2018) report led by Joseph Murphy at the School of Interdisciplinary Studies at the University of Glasgow. This set out the broad areas where the GSA Biosphere hoped to make progress and generate collaborations with other research institutes. This included:

- Generic / institutional
- Applied Science
- Social Science
- Arts & Humanities
- Interdisciplinary

The 2014-2018 Research Priorities were reviewed by the partnership board in 2018 where it was found that the Biosphere had:

- made good progress in around one third of the research priorities.
- initiated research in a further one third.
- not yet started progress in less than one third of the list.

The pressures of competing land use priorities in southwest Scotland and GSA Biosphere's involvement in stimulating discussion amongst stakeholders around this topic, have resulted in the Biosphere being a key partner in research into future approaches on land use in Scotland. The GSA Biosphere Director and Board members have contributed extensively to consultations, papers and seminars on this subject over the last ten years and a number of the research initiatives highlighted below are a result of this involvement.

The main institutions conducting research or monitoring in the Biosphere reserve include:

- James Hutton Institute
- Edinburgh University
- University of the Highlands and the Islands
- Glasgow University
- University of Strathclyde
- Forest Research
- Scotland's Rural College (SRUC)

The GSA Biosphere has undertaken multiple collaborations with higher education institutions including:

- Forland - a project running between 2019/21 supported by GSA Biosphere and initiated by Forest Research/University of Edinburgh that focused on developing a Shared Vision for Sustainable Regional Land Use in the Biosphere. https://era.ed.ac.uk/handle/1842/38096
- A 2014 MSc was completed considering environmental values and ecological views of communities within the area follow the UNESCO Biosphere designation with a student from University of Edinburgh
- Since 2019 MSc students from the University of Strathclyde have been working with GSA Biosphere on marketing initiatives based on the UNESCO Biosphere designation.
- James Hutton Institute have used the GSA Biosphere approach to Sense of Place to explore the measuring of cultural ecosystem services with local communities. This has led on to an online Story Tour of Glentrool where local residents described their community and what makes it special. https://storymaps.arcgis.com/stories/f2fa8d3ae5bf4cba9dc77ce619800dae
- GSA Biosphere has also been a participant in SHERPA an EU wide research project led in Scotland by James Hutton Institute on issues facing rural areas, across policy, and natural and cultural heritage. https://ec.europa.eu/info/strategy/priorities-2019-2024/new-push-european-democracy/long-term-vision-rural-areas_en
- There are currently two PhD students at the start of their research who are using the GSA Biosphere and its extensive network of stakeholders as a focus for exploring how future land use can deliver for the environment, the economy and wider society in a balanced and equitable way.
- GSA Biosphere officers have regularly supported the local University campuses as a guest lecturer or through hosting visits within the UNESCO Biosphere.

FURTHER EDUCATION

Ayrshire Colleges Learning Partnership

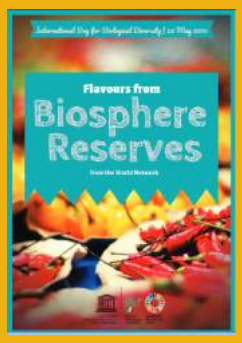
An initial discussion between representatives from Ayrshire College and the GSA Biosphere saw the opportunity to develop more formal links between both organisations which would have a range of mutually beneficial outcomes. The college has 14,189 students based over eight campuses across Ayrshire who are supported by 800 staff. Many of the staff and students either live in the Biosphere or use the area for recreation. A formal partnership arrangement was agreed between Ayrshire College and the Biosphere in 2017 which has seen the two organisations working together more closely in a Learning Partnership.

The opportunity provides a platform locally for the Biosphere to engage, demonstrate and provide learning experiences for a significant number of students and wider community engagement opportunities to promote and raise the profile of the Biosphere. The Biosphere benefits from the relationship through increased awareness and recognition of the role that it plays locally, particularly within the 16–25 age range which has been difficult to focus on historically. The students of all disciplines have the opportunity to research and demonstrate how their studies can create new sustainable entrepreneurial opportunities in Galloway and Southern Ayrshire. Students studying hospitality have been tasked with creating a menu made up of local produce sourced from within the Biosphere that can be sold through local cafes. Or tourism students were to design a new guided tour that takes in some of the Biosphere's key natural and cultural heritage.

In March 2018 the students ran Biosphere Awareness raising events across three of their campuses. Aimed at students and staff, they were intended to highlight the UNESCO Biosphere and the vast range of opportunities it provides to local people.

The students researched what the Biosphere represented, planned the events - including stalls, information for attendees and logistics - and acted as comperes to those that attended. The highlight of the three events was a "Ready Steady Cook" demonstration that used local produce from the Biosphere and involved interviews with some of the Biosphere Partnership Trustees.

International Day of Biodiversity – Case Study



In 2019 as part of a celebration for International Day of Biodiversity the GSA Biosphere invited students from Ayrshire College to contribute to a UNESCO initiative celebrating the role that local food can play in sustaining local biodiversity. The students put together a local recipe of "Navarin of lamb printaniere" also based on sustainable local produce which was selected to be in an international UNESCO recipe book "Flavours from Biosphere Reserves". The recipe was developed by The Level 4 Professional Cookery Students at Ayrshire College.

Education for Sustainable Development

The work undertaken by the GSA Biosphere on environmental & sustainability education has been running since the before GSA Biosphere's formal designation. It started with the BOB project which ran from 2011-2013. Learning from Experience was a conference run by GSA Biosphere that brought together examples of outdoor education from across the Biosphere. This was a knowledge sharing session to both inspire and identify a more coordinated approach to future learning opportunities within the Biosphere.

The BOB Project

One of the key objectives of the BOB project was to raise awareness of natural values associated with the GSA Biosphere and to pro-actively engage with schools.

In addition, the Project officers led both classroom and field sessions with local schools throughout the 10 years of the GSA Biosphere to the present day.

A dedicated member of staff known as a 'Communities and Education Officer' was employed between 2014-2017 and again from 2021 onwards. In the time periods where there has not been a dedicated member of staff assigned to this position, the GSA Biosphere Coordinator or project officers have overseen education activities as part of their wider remit.

This has enabled numerous educational initiatives to flourish, with many demonstrating a key focus on enhancing sustainability education outcomes. This has been guided by the GSA Biosphere strategic objective to 'Facilitate Sustainability Science and Education for Sustainable Development', with 'Research and Learning' a key theme of the GSA Biosphere Partnership Board highlighted within the Strategic Plan 2017 - 2022.

The experiences have been wide and varied from sessions on 'food miles' to expeditions into the wilderness at the core of the Biosphere.

More recently work has focused on the development of an educational toolkit that can has been developed in partnership with a local school and will be made available to local education practitioners who wish to focus on the sustainability credential of the Biosphere.

Wonderful World of Water

In May 2012, GSA Biosphere facilitated an initiative involving students and teachers from Kirkcowan Primary School who joined a Scottish Environment Protection Agency (SEPA) ecologist and fisheries biologists from Galloway Fisheries Trust, to help catch and handle fish, bugs and beasties that live in their local river, and learn how to be 'pollution detectives'. The students also found out about upcoming 'water' activities over the coming months, including learning to fish with professional coaches from 'Borderlines', and a 'mud skate' at Wigtown Bay with the Dumfries and Galloway Ranger Service.

Lifelong Learning

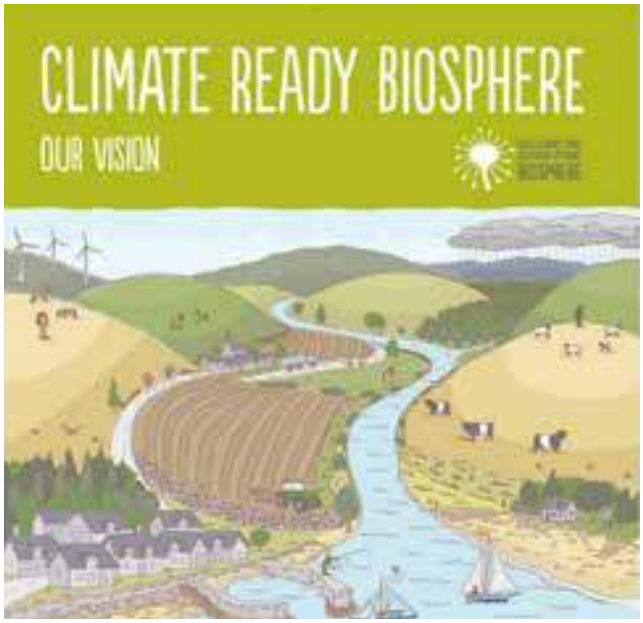
Integrating climate change awareness and readiness is intertwined into the core Biosphere vision and objectives. The Biosphere has a strong focus on building resilient communities and sustainable businesses. The GSA Biosphere aims to bring people together to encourage joined up thinking and sharing of best practise to act as a catalyst for action.

Climate Ready Biosphere

The Climate Ready Biosphere Vision and Action plan was developed in 2014 and provides a guide to the stakeholders of the Biosphere on the challenges that climate change will pose, the real-world impacts being faced and the GSA Biosphere vision to combat these challenges. The Vision and action plan were developed through a series of workshops which took participants on a journey from recognising and understanding what climate change is, through to options for adaptation to counter threats and make the most of the opportunities.

The plan was developed by the Biosphere Partnership Board and Adaptation Scotland, who provided important leadership and endorsement of the project, and the wider Biosphere staff who played a crucial role in involving a wide range of organisations, businesses and communities in the project. Participants included public sector organisations, local community groups, businesses and academics.

The Climate Ready Action Plan provided guidance on steps communities and businesses could take. It has acted as a central focal point that pulled together many of the other examples of best practise that have been undertaken across land use, communities and businesses and are listed in this report.



Biosphere Footsteps

More recently the Biosphere Team have undergone Carbon Literacy training which has inspired the development of a new initiative called Biosphere Footsteps. These engaging and interactive workshops are designed for all ages and aimed at community or school groups, to explore the issues that are at the front of all our minds at this crucial time, including saving energy and cutting waste, the impacts of climate change on the environment, people and wildlife, reducing our impact on the environment through our lifestyles and choices, and understanding the UN Sustainable Development Goals. They are an opportunity to learn how individuals and communities can reduce their carbon footprint. Participants receive a Carbon Literacy certificate on successful completion of the course.

BIOSPHERE FOOTSTEPS
TOWARDS SUSTAINABLE LIVING

National and International Learning

A key role of all UNESCO Biospheres is how they contribute and benefit from being members of the national and international network of Biospheres around the world. GSA Biosphere has been a regular contributor the European MAB Network and has sought to continually foster new partnerships and share knowledge with other Biospheres.

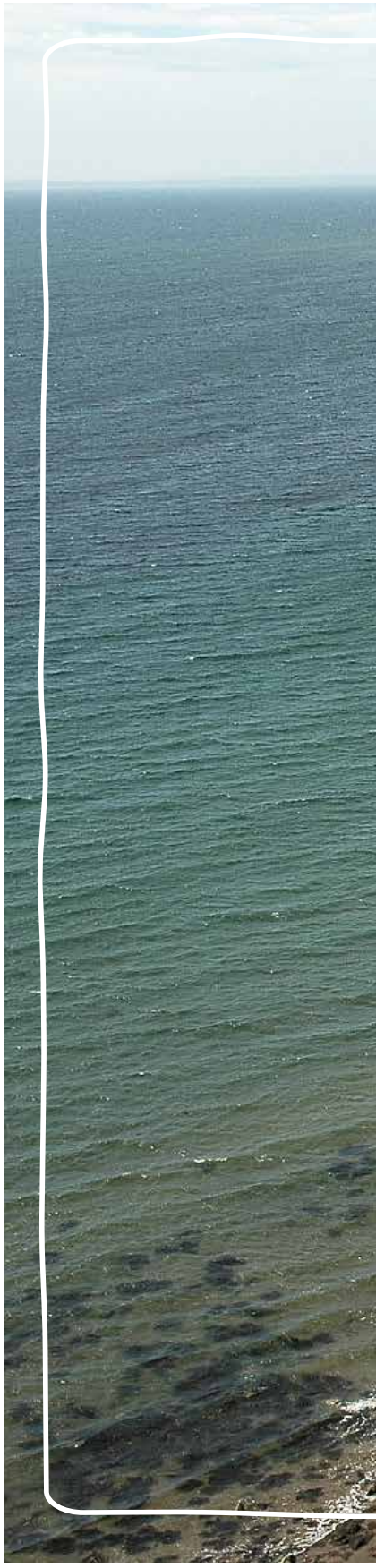
In April 2012 GSA Biosphere officers led a small group of artists, writers and designers from SW Scotland on a learning journey to Slovakia that included the East Carpathian Biosphere Reserve and the Poloniny Dark Sky Park. The learning journey aimed to inspire those participating to share their experiences and to develop new approaches to their work. On their return they replicated many of their Slovakian experiences through a facilitated visit to the core of the Biosphere accompanied by a specialist who interpreted their local landscape to them based on its Gaelic place names, an ecologist who inspired an understanding of the international significance of habitats in the Biosphere and a forest planner who shared his vision for a balancing timber production with biodiversity.

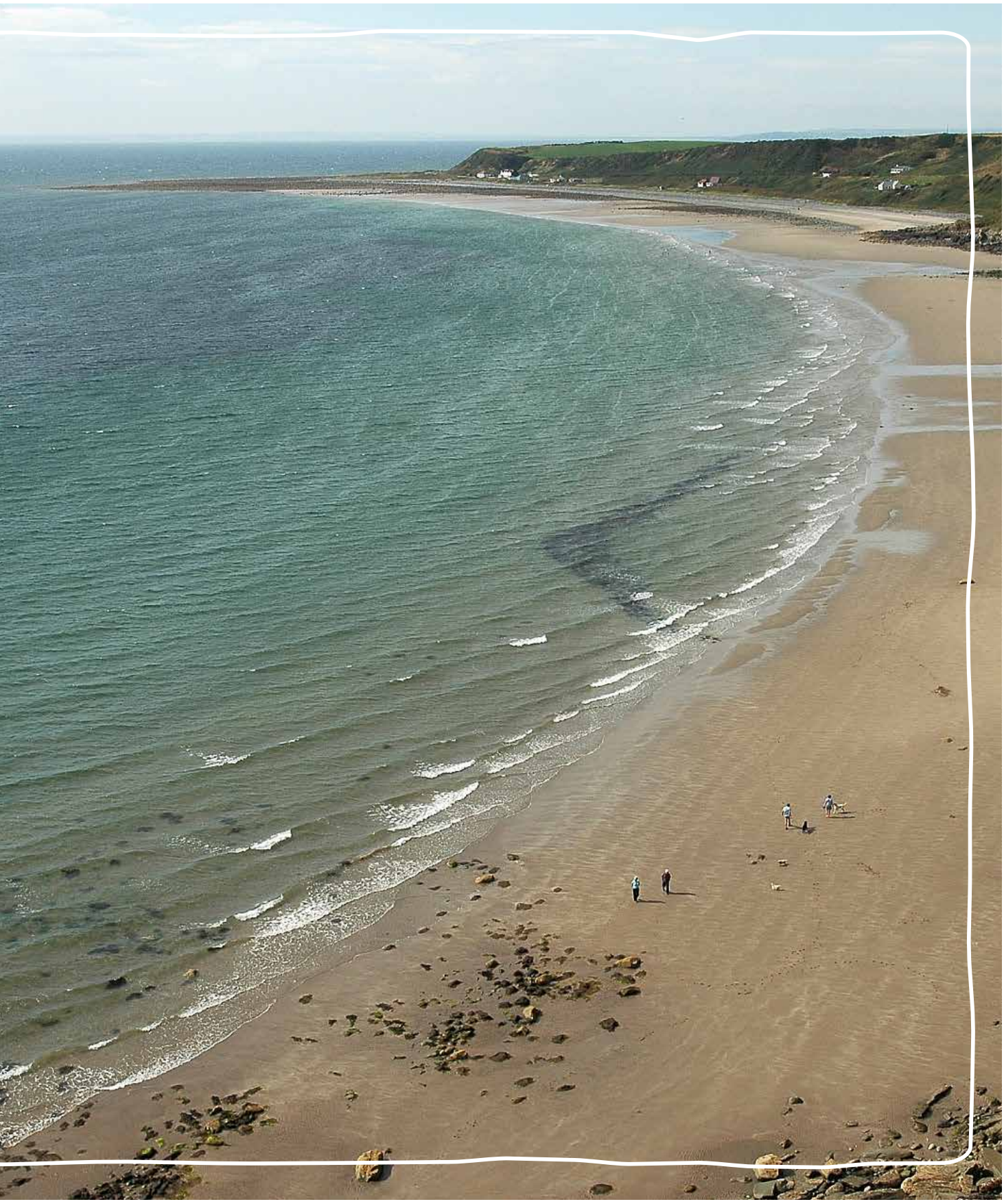
In 2014 GSA Biosphere hosted a visit from the Urdaibai Biosphere reserve who were exploring opportunities for future partnership working. A result, a small contingent from the GSA Biosphere undertook a return visit in October 2015. The trip provided valuable insight to the Partnership Board on the governance structure of the Urdaibai Biosphere and across topics such as:

- Community Woodland management
- Branding and Marketing of local produce
- Development of partnerships with local business
  With funding secured through D&G LEADER five local stakeholders from the Biosphere joined officers on a learning journey to the Rhön Biosphere in Germany at the end of November 2019 to explore the value of Biosphere branding for local products. The visit built on the GSA Biosphere's experience of having launched its own certification mark in 2018.

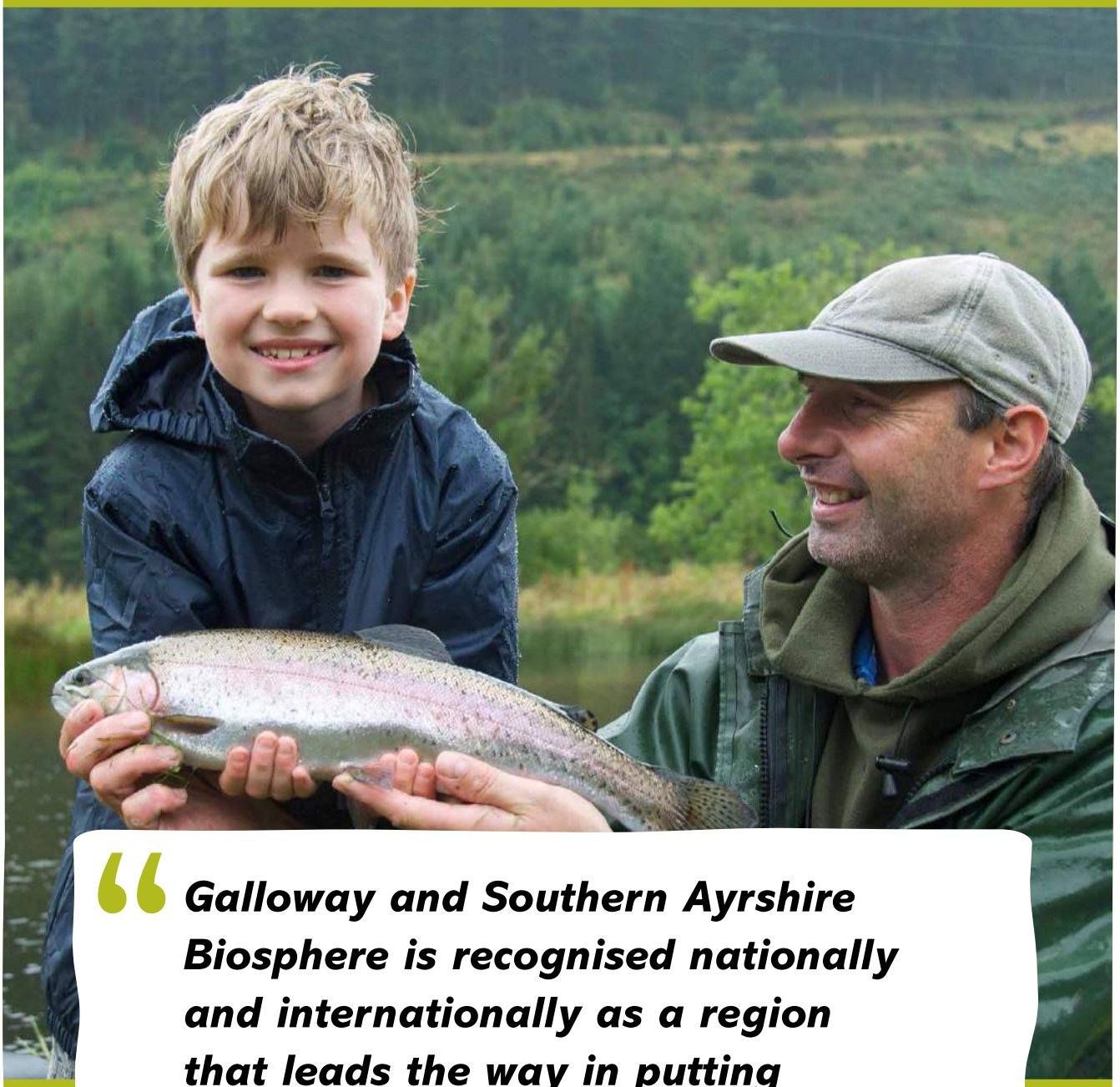
In 2019, 10 participants from the GSA Biosphere attended a learning journey to North Karelia, Finland through the SHAPE project and 10 participants from Finland, Iceland and Wester Ross, Scotland were welcomed to the GSA Biosphere. The Project aimed to be an international exchange of ideas and knowledge that could lead to a boost in eco-tourism in Southwest Scotland. The GSA Biosphere learning journey was focused on Glentrool, The Cree Valley and Newton Stewart. The trip aimed to share the GSA Biosphere's experience around heritage, land management and eco-tourism.

Throughout the last ten years GSA Biosphere has hosted visits or contributed to dialogue with national and international partners wishing to consider UNESCO Biosphere status.





LOOKING FORWARD



"Galloway and Southern Ayrshire Biosphere is recognised nationally and internationally as a region that leads the way in putting sustainability at the heart of the way that we live, work and play."

As part of the Periodic review process the GSA Biosphere partnership board wanted to look forward as well as reviewing previously undertake work. The aim was to understand stakeholders' views on what the potential future priorities for the GSA Biosphere should be. As part of the stakeholder engagement process attendees were asked to share their views of how the Biosphere could best support them moving forward and what the key lessons from the last 10 years had been. The outcomes of this work will help shape the Biosphere's work over the next 10 years.

The targeted workshops and electronic survey to public revealed several areas that stakeholders would like to see prioritised over the coming 10 years of the Biosphere's development. These were separated into four main themes: the natural environment, society, economy and strategic objectives.

PRIORITIES FOR THE NEXT 10 YEARS

Lifelong Learning

Three major priorities relating to the natural environment emerged from our research. Stakeholders want to see the GSA Biosphere continue to support communities and businesses tackle the climate emergency by acting to mitigate, adapt and increase resilience of habitats, communities and businesses to climate change.

They want to see the Biosphere tackle the biodiversity crisis by acting to halt and reverse negative impacts on the natural environment. This includes improving biodiversity, restoring habitats and iconic species populations through promoting the use of nature-based solutions and supporting integrated approaches to sustainable land management.

Finally, they want to see the Biosphere promote sustainable development within planetary boundaries, by encouraging residents to alter their mindsets and lifestyles. To achieve these three priorities, land-use must be made more sustainable and drive to achieve multiple benefits. Work to develop business cases for natural capital focused investment should be supported and expanded upon.

Society

From a business perspective, it was felt that it will be important to keep working on and better advertise biosphere-friendly business practices. Specifically, the Biosphere should promote the marketing value of the Certification Mark and Proud supporter network. It should also provide well-advertised advice on how businesses can become more sustainable and how they can get involved in schemes to help tackle the climate and biodiversity crises (e.g., carbon sequestration schemes involving peat bog restoration).

As previously mentioned, stakeholders wanted to see current work around communication and engagement maintained and improved in the future. The Biosphere should be made into a recognised brand, that puts Galloway and Southern Ayrshire Biosphere on the map, and so that communities and businesses can understand how far its sphere of influence extends, what it does and does not do, its views on key issues (e.g. afforestation and windfarm development) and how people can get involved.

It should expand on educational and wider-reaching initiatives, fostering both children's and adults' relationship with nature and the historical and cultural heritage of the Biosphere's landscape. Recent initiatives with Galloway Glens LPS, Coalfield Communities LPS and PLACE have been a huge success and more should follow.

Communities expressed their desire to be better engaged with the Biosphere in the future. This means improving awareness around ongoing and future work and reaching all residents no matter their age, job or geography. The biosphere should also prioritise making the voice of rural communities better heard so that no area is underserved.

Stakeholders also noted the need to promote collaboration between communities, businesses and landowners, especially in cases where there are competing land-use requirements. It is important to bring people together, pulling in a unified direction to preserve and increase the Biosphere's natural assets. Collaboration will also help deal with conflict and find opportunities for synergies and sharing of best practice.

Economy

A key priority for stakeholders over the next 10 years is to establish better mechanisms to secure funding, e.g. by running pilot projects and presenting the case for continued investment in the Biosphere from the Scottish Government equal to that of a national park. The Biosphere must continue to use the SoSE funding it has received efficiently and look to unlock a mixture of public and private funding opportunities.

Communities, businesses and strategic partners all mentioned the need to further support sustainable tourism in the region. Work should be done to promote communities as tourist destinations, advertise biosphere-friendly business practices and certification marks, and establish strategic leadership (e.g. regional leader and action plan for sustainable and community led tourism for the new Ayrshire & Arran Visitor Economic Strategy).

Strategic objectives

Strategic partners highlighted the additional need to deliver on key objectives around sustainable tourism, providing greener jobs and investing in natural capital. This could be achieved by fully taking advantage of existing partnerships.

As part of the stakeholder engagement process, responders were asked to identify what they felt the GSA Biosphere's priorities over the next 10 years should be. The most popular themes are shown below.

The Biosphere should establish a common vision for its future direction and in doing so promote joined up thinking.

It should prioritise partaking in a wide variety of initiatives that focus on the themes of climate resilience, biodiversity and sustainability, that involve and impact all stakeholders (e.g., via Biosphere Towns, Landscape Enterprise Networks and Rural Land Use Partnerships). Pilot projects demonstrating the delivery of multiple benefits will be important in informing regional strategies and larger scale projects.

The Biosphere should also prioritise its work of establishing itself as a leader and expert in the region and beyond. This could involve leading in place planning, shifting land-use, sustainable living and sustainable tourism. Being formally recognised as a consultee on planning by the Scottish Government would be a big step forward.

Finally, stakeholders wanted the Biosphere to grow its visibility and showcase its achievements. The Biosphere is an example of how the economy can work in the service of people and planet, and it must take advantage of that; in parallel, this increased visibility will help it continue its own learning journey and open opportunities for collaboration.

Update to the GSA Biosphere Boundary

As part of the Periodic review reporting process the GSA Biosphere Partnership Board took the opportunity to review the Biosphere Boundaries and to canvass stakeholder's views on whether they should be altered.

When first designated a decision was taken to end the GSA Biosphere boundary at the high-water mark along the coast as marine planning in Scotland was undergoing a major review. The terrestrial side of the Biosphere was largely based on river catchments, and as no river catchments from the core of the Biosphere flowed onto the Rhins of Galloway that area was not included. In retrospect the Biosphere Partnership Board have been keen to address elements of both of these decisions.

The focus on river catchments led to the Rhins of Galloway peninsular being left somewhat isolated. Communities, businesses and key stakeholders from the area have regularly questioned the original decision. As part of the periodic review process a wider public consultation was held which generated unanimous support for future inclusion. The proposal also includes minor alterations made to the terrestrial boundary to follow updated Scottish government data boundaries enabling more accurate socio-economic analysis in the future.

The desire to include the marine environment was based on the fact that the ecological and social dimensions of the region don't end at the coastline. By including this area, the GSA Biosphere Partnership can take a more holistic approach to the future management of the Biosphere. The exclusion of the marine environment meant a significant ecosystem was not being considered. As part of the consultation on the Rhins and a wider online public survey, stakeholders were asked if they believe the marine environment should be included within the GSA Biosphere, 82% of responders supported the inclusion of the marine environment.

Subject to UNESCO approval on the boundary changes, the Biosphere Partnership will be extended to bring in expertise from local organisations involved in the marine environment. The proposed updated boundary is shown in the map with the cross hatched area showing the terrestrial extension and the blue area showing the marine extension. The enlarged Biosphere will cover 9849 square km, of which roughly one third will be in the marine environment.

Proposed extension to the GSA Biosphere

APPENDIX A – DESKTOP REVIEW DATA SOURCES

SOCIETY AND COMMUNITIES

In light of the COVID-19 pandemic, the methods used during the Periodic Review process had to be adjusted to follow the Scottish Government guidance at the time. Digital stakeholder engagement tools such as Microsoft teams and the Miro Whiteboard software were used when face to face workshops were not possible. In addition, an online survey open to the general public was distributed electronically. The COVID-19 pandemic has impacted on access to open-source data, e.g. The 2021 census in Scotland was delayed for 12 months meaning that the only census data available was that gathered in 2011 a year before designation.

The data used to measure societal indicators was predominately based on Census data from 2011 as that is the most recent data in the public domain. In addition to this being some years old, it was also only possible to obtain data at data zone and local authority level. Data therefore does not map directly on to the Biosphere boundary but pertains to the general area of Southwest Scotland within which the Biosphere lies.

Society Data sources

Data	Source
Population	Scottish Government (2022) Dwellings per Hectare [Online] Available from: https://statistics.gov.scot/resource?uri=http%3A%2F%2Fstatistics.gov.scot%2Fdata%2Fdwellings-hectare (Accessed 10 March 2022)
Household	Scottish Government (2022) Household Estimates [Online] Available from: https://statistics.gov.scot/slice?dataset=http%3A%2F%2Fstatistics.gov.scot%2Fdata%2Fhousehold-estimates&http%3A%2F%2Fpurl.org%2Flinked-data%2Fcube%23measureType=http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fmeasure-properties%2Fcount&http%3A%2F%2Fpurl.org%2Flinked-data%2Fsdmx%2F2009%2Fdimension%23refPeriod=http%3A%2F%2Freference.data.gov.uk%2Fid%2Fyear%2F2020 (Accessed 10 March 2022)
Schools and Formal Education Facilities	National Records of Scotland (2011) Scotland's Census 2011 – Table QS501SC – Highest level of qualification [Online] Available from: https://www.scotlandscensus.gov.uk/search-the-census#/location/topics/list?topic=Ethnicity,%20Identity,%20Language%20and%20Religion&categoryId=4 (Accessed March 10 2022)
Health and Wellbeing	National Records of Scotland (2011) Scotland's Census 2011 – Table QS302SC – General Health [Online] Available from: https://www.scotlandscensus.gov.uk/search-the-census#/location/topics/list?topic=Ethnicity,%20Identity,%20Language%20and%20Religion&categoryId=4 (Accessed March 10 2022) National Records of Scotland (2022) Healthy life expectancy in Scotland, 2018 – 2020 [Online] Available from: https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/life-expectancy/healthy-life-expectancy-in-scotland/2018-2020 (Accessed March 10 2022) Scottish Government (2019) Disability – Scottish Surveys Core Questions [Online] Available from: https://statistics.gov.scot/slice?dataset=http%3A%2F%2Fstatistics.gov.scot%2Fdata%2Fdisability-sscq&http%3A%2F%2Fpurl.org%2Flinked-data%2Fcube%23measureType=http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fmeasure-properties%2Fpercent&http%3A%2F%2Fpurl.org%2Flinked-data%2Fsdmx%2F2009%2Fdimension%23refPeriod=http%3A%2F%2Freference.data.gov.uk%2Fid%2Fyear%2F2019&http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fdimension%2Fage=http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fconcept%2Fage%2Fall&http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fdimension%2Fgender=http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fconcept%2Fgender%2Fall&http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fdimension%2FhouseholdType=http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fconcept%2Fhousehold-type%2Fall&http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fdimension%2FtypeOfTenure=http%3A%2F%2Fstatistics.gov.scot%2Fdef%2Fconcept%2Ftype-of-tenure%2Fall

ECONOMY

A significant proportion of the assembled data has been provided at Local Authority Level rather than Data zones as economic data is not readily available at this resolution. Data for the three Local Authorities that form the Galloway and Southern Ayrshire Biosphere; Dumfries and Galloway, South Ayrshire, East Ayrshire have been sourced and analysed where more detailed spatial data was 4not available. The Galloway and Southern Ayrshire Biosphere only forms part of the total area for each of the Local Authorities so total values do not provide a representative profile for Biosphere itself. Where required average values have been used.

Economy Data sources

Data	Source
Gross Value Added (GVA)	Census 2011 KS009a - Economic activity - ONS Crown Copyright Reserved [from Nomis in February 2022]
Economic Activity	Census 2011 KS009a - Economic activity - ONS Crown Copyright Reserved [from Nomis in February 2022]
Employment	Census 2011 KS009a - Economic activity - ONS Crown Copyright Reserved [from Nomis in February 2022]
Enterprises by industry type	Census 2011 KS009a - Economic activity - ONS Crown Copyright Reserved [from Nomis in February 2022]

NATURAL ENVIRONMENT

Data on the natural environment was gathered from a range of sources, primarily NatureScot via a Data Licence allowing access to spatial datasets held. Key documents were referred to including the Galloway and Southern Ayrshire Natural Heritage Management Plan. Spatial analysis of datasets was undertaken using ESRI ARCGIS with data being cut to the Galloway and Southern Ayrshire Biosphere boundary.

Natural Environment Data sources

Data	Source
Biosphere Boundary and zonation	Biosphere Reserve – Scottish Government [https://data.gov.uk/dataset/e372897d-7bd5-4854-ac8c-88100bd94999/biosphere-reserves-scotland]
Land Cover	Scotland Habitat Map – Nature Scot https://www.nature.scot/landscapes-and-habitats/habitat-map-scotland
Designated sites SACs, SPAs, SSSIs, SNP, NNRs, LNRs	SAC Special Areas of Conservation; SSSI Sites of Special Scientific Interest; SPA Special Protected Areas; Ramsar; Local Nature Reserves; National Nature Reserves. [OGL data from data.gov.uk, accessed Jan 2022
Woodland and forestry cover	National Forest Inventory 2020 [https://data-forestry.opendata.arcgis.com/maps/20be39f450ab40e38f1d4ed0f6ba3100]
Agricultural productivity	Land Capability for Agriculture, Scotland [OGL data from data.gov.uk, accessed Jan 2022]

Galloway & Southern Ayrshire UNESCO Biosphere would like to thank the following for their generosity in contributing photographs to this report: Iain Leach; Peter Norman; Nic Coombey; Esther Tacke; Warren Sanders; and the Galloway Photographic Collective.

GALLOWAY AND
SOUTHERN AYRSHIRE
BIOSPHERE

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