CREW CENTRE OF EXPERTISE FOR WATERS

Taking a collaborative approach in the water sector: A review of the Metropolitan Glasgow Strategic Drainage Partnership Supplementary Information Annexes 1-4

MGSDP Sustainably Drain Glasgow

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Supplementary Information

Annexes 1-4

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Abbreviations

BGI - Blue Green Infrastructure

BG - Blue Green

BGG - Blue Green Grey

CaLL LPD - Clyde and Loch Lomond Local Plan District

CC - Climate Change

CG - Clyde Gateway

CGIWP - Clyde Gateway Integrated Water Plan

CM - Clyde Mission

CP - Clydeplan

CRC - Climate Ready Clyde

CSO - Combined Sewer Overflow

EDC - East Dunbartonshire Council

FAS - Flood Alleviation Scheme

FRM - Flood Risk Management

FRMC - Flood Risk Management Community

FRML - Flood Risk Management Lead

GCC - Glasgow City Council

GCVGN - Glasgow and Clyde Valley Green Network

GI - Green Infrastructure

GSDP - Glasgow Strategic Drainage Plan

CSGN - Central Scotland Green Network

LA - Local Authority

MGSDP - Metropolitan Glasgow Strategic Drainage Partnership

MLP - Multi-Level Perspective

NBS - Nature Based Solutions

NLC - North Lanarkshire Council

NPF - National Planning Framework

NR - Network Rail

NS - Nature Scot

OECD - The Organisation for Economic Co-operation and Development

RC - Renfrewshire Council

SC - Scottish Canals

SE - Scottish Executive

SF - Scottish Forestry

SfS4 - Sewers for Scotland 4

SG - Steering Group

SLC - South Lanarkshire Council

SUDS - Sustainable Drainage Systems

SW - Scottish Water

SWMP - Surface Water Management Plan

TG - Technical Group

TS - Transport Scotland

Contents

Annex 1.1 Literature review methodology

The literature review assessed academic and grey literature on approaches to collaborative and cross-sectoral / institutional partnership approaches in the public policy sector (within and out with the water sector). The MGSDP was reviewed within this context and compared to other similar partnerships elsewhere in the UK and internationally. Literature was collected from common academic database and search engines (e.g., ISI Web of Science, Scopus, Google Scholar, Directory of Open Access Journals). Grey literature (press articles, online sources) was also used.

The volume of literature collected for the collaborative partnerships review was 93 papers with 56 selected and screened for review. Searches were guided by governance themes (e.g., arrangement, drivers, barriers, function, resources, policy, regulation) with key word searches used (e.g., public partnerships, urban water sector, cross sectoral partnerships, integrated water management). This review included theoretical understanding of governance and management arrangements with practical examples presented from cities globally to demonstrate different attributes of partnership approaches.

The volume of literature collected for the MGSDP review was 109 papers and reports including MGSDP newsletters and briefing notes with 86 selected and screened for review. Searches were guided by reference to the 'MGSDP', and key word searches based on MGSDP objectives and guiding principles (i.e., climate resilience, drainage infrastructure, economic development, habitat improvement, integrated investment, placemaking, planning policy, stakeholder collaboration).

Annex 1.2 Collaborative partnerships review supplementary information

Partnership approaches and arrangements in the public sector are shaped by underlying governance models. Various models and theories exist that explain governance processes (van Montfort et al., 2014, Romano and Akhmouch, 2019). The Organisation for Economic Co-operation and Development (OECD) defines water governance as *"a range of political, institutional and administrative rules, practices and processes (formal and informal) through which decisions are taken and implemented, stakeholders can articulate their interests and have their concerns considered, and decision-makers are held accountable for water management"* (Akhmouch and Correia, 2016).

Traditionally, water governance was the sole responsibility of public entities, but given the increasing role of the private sector, communities and the inclusion of other stakeholder groups, water governance approaches have evolved towards improved governance for successful integrated water management that meet sustainability goals (Da Silva et al., 2008, Collins et al., 2020). Climate change and the need for adaptation strategies and resilience building has also contributed to a rethink of management approaches towards integrated and collaborative approaches (Pahl-Wostl et al., 2013, Berkes 2017).

Different forms of governance are now described in literature, ranging from state-centric, top-down traditional governance to society-centric, market based multilevel, multi-actor arrangements. In practice, organisations adopt different elements and mixes of these models (Romano and Akhmouch, 2019). Several factors are key to enhancing institutional decision-making processes and resilience of a partnership such as social capital (leadership, trust, networks) and individual capacity that draws from partner experiences (self-organizing, knowledge generation and learning). Adaptive governance emphasizes the ability of systems to adapt to change and enhance the resilience and flexibility of management systems to cope with future uncertainties and complexities (Chaffin et al., 2014, Berkes 2017, Fraser and Kirbyshire 2017, Avello 2019).

There is now broad agreement, however, that poor governance or the lack of governance capacity is at the core of many policy and water crisis failures (Howlett et al., 2015). Water resource management can be hindered by governance challenges such as fragmented institutional structures, unclear allocation of responsibilities, financial management and lack of strategic planning (OECD, 2011 and 2018). It is within these concepts that the OECD developed 3 key dimensions for water governance supported by 12 principles as a means to mitigate these risks in a sustainable, integrated and inclusive way (Figure 1) for stakeholders involved in water policy design and implementation (Lockwood et al. 2010, OECD 2021):

1. **Effectiveness** - clear roles and responsibilities; manage water at appropriate scales within integrated basin systems; cross-sectoral coordination between water and environment policies; capacity of responsible authorities for water challenges and required competencies

2. **Efficiency** - share water and water related data and information; governance arrangements should mobilise financing and resources; regulatory frameworks enforced in pursuit of the public interest; innovative water governance arrangements
3. **Trust and engagement** - integrity and transparency across water policies; promote stakeholder engagement; water governance frameworks that manage trade-offs across water users, rural and urban areas and generations; monitoring and evaluation of water policy and governance.

Figure 1: The OECD 3 key dimensions and 12 principles of water governance (after Akhmouch and Correia, 2016).

Attributes of good and adaptive water governance systems

Key Attributes of good and adaptive water systems (Djalante 2012, OECD 2018, Avello 2019, Bayrak et al., 2020) include:

1. **Coordination and collaboration** – of, e.g., FRM approaches and knowledge pooling from multiple actors with a focus on coordination and collaboration across different stakeholders, sectors and across different levels to overcome fragmentation (Couper et al., 2019, Collins et al., 2020).
2. **Polycentric** – a system where multiple stakeholders across multiple levels and sectors organise to form several independent but coexisting decision-making centres (Ostrom, 2010).
3. **Participation** – equitable and inclusive participation of stakeholders at appropriate scales / phases to enable contribution and active participation in decision making processes. Public stakeholders should also be involved in the design, implementation and evaluation of projects. As outlined in Arnstein's ladder (1969), the eight degrees of public participation range from non-participation (education and manipulation) to citizen power (partnership, delegation and citizen control).
4. **Deliberation** – closely linked to participation, this brings together different perceptions, opinions and integrating different forms and sources of knowledge (Lebel et al., 2006). This is seen as a move towards meaningful stakeholder participation as it helps to bring together different perceptions and views and integrates different sources of knowledge (Arnstein, 1969).

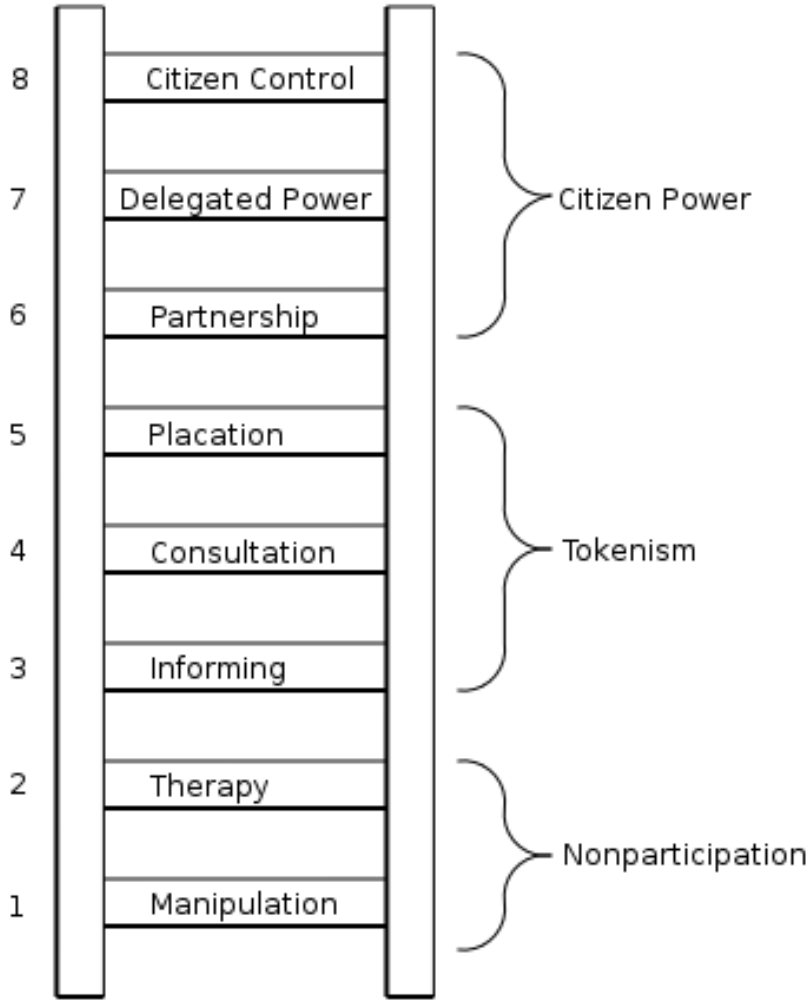


Figure 2: Arnstein's ladder of engagement (1969).

5. **Equity and inclusiveness** – trust building; shared understanding among stakeholders increases collaboration between stakeholders including affected communities (Collins et al., 2020).
6. **Accountability and transparency** – availability and sharing of reliable information with the public in a transparent way to explain solutions and decisions (Lebel et al., 2006).
7. **Adaptive capacity** – ability of the system to self-organise through formal and informal networks to cope with different shocks, stresses and uncertainties. The ability to adapt increases capacity to tackle future changes and evaluate activities overtime (Lebel et al., 2006).

Collaborative partnerships in urban water management

A study of selected cities globally illustrated different partnership approaches and arrangements to urban water management. Partnership arrangements reflect water governance attributes with overlapping characteristics e.g., all partnership arrangements reviewed promoted social learning, knowledge co-design, and multi stakeholder participation.

Although reviewed partnerships were established in different contexts and in response to different drivers / policies (Table 1), partnership arrangements have common features. For some partnerships, governance models changed over time while others use a mix of models. For example, the Leipzig case study changed overtime to adopt a mixed governance approach involving public authorities, the private sector, civil society, NGOs and academia to improve the acceptability and sustainability of Nature Based Solutions (NBS) (Dushkova and Haase, 2020).

A key observation from partnership arrangements is the time taken to develop successful collaborative partnerships e.g., Portland, Oregon an internationally renowned leader in managing stormwater, has one of the oldest Green Infrastructure

Table 1: Summary of reviewed partnerships by country		
City and Country	*Study Focus*	*References*
Edinburgh, Scotland	*Edinburgh and Lothians Strategic Drainage Partnership*	*Lawrence, P., 2020*
London, England	*Green roofs / walls in London, public private partnerships*	*Grant and Gedge, 2019*
Sheffield, England	*Collaborative planning and partnership approaches to integrate bottom up local citizen engagement*	*Wild, T., 2020*
Newcastle, England	*Newcastle Learning and Action Alliance*	*O'Donnell et al., 2020*
Manchester, England	*Public-Private partnerships*	*O'Sullivan et al., 2020*
Liverpool, England	*Localised approach to implement small NBS to address fragmented urban land ownership issues*	*O'Sullivan et al., 2020*
Sheffield, Gloucester & Oxford, England	*Transition to FRM - achieving policy objectives*	*Butler and Pidgeon, 2011*
Leipzig City, Germany	*NBS implementation, drivers, governance and design options*	*Dushkova & Haase, 2020*
Munich, Germany	*Polycentric governance / living labs to encourage NBS uptake*	*Zingraff-Hamed et al., 2019*
Germany / Netherlands Rhine Basins	*Integrated, adaptive and collaborative approaches to FRM*	*Pahl-Wostl et al., 2013*
De Stadswerven & West Flank, Netherlands	*LAA approach to FRM*	*Van Herk et al., 2011*
Genk, Belgium	*Public-Civic partnerships to low carbon transitions*	*Gorissen et al., 2018*
Valladolid, La Coruña, Valencia, Spain	*NBS that increase connectivity between green spaces*	*O'Sullivan et al., 2020*
Lake Ringsjon Ronne Catchment, Sweden	*Collaboration across different water governance levels*	*Wild, T., 2020*
Eco city Augustenborg, Malmö, Sweden	*BGI ethical concerns and expectations*	*Mottaghi et al., 2020*
Malmö and Gothenburg, Sweden	*Social learning barriers to green and adaptive goals*	*Johannessen and Mostert, 2020*
Sofielund, Sweden	*Perceptions of local stakeholders in redevelopment / regeneration*	*Olsson et al., 2020*
Potznan, Wroclaw, Poland	*Neighbourhood resilience to urban flooding and enhancing cohesive / active community lifestyles*	*O'Sullivan et al., 2020*
Cooks River Catchment, Sydney, Australia	*Governance experimentation / success factors - urban water sector*	*Bos and Brown, 2012*
Portland, Oregon, USA	*Public-Private partnerships: BGI projects*	*O'Donnell et al., 2020*
Mississippi, USA	*Adaptive and strategic FRM - dynamic and well funded expertise is itself a driver for change*	*Wesselink et al., 2015*
Bangkok, Thailand	*Public-Private Partnerships for flood risk reduction*	*ADPC'S NEWS, 2017*

(GI) programs in the US, but this took decades to establish. The city's restoration programme promotes sustainable development, climate change adaptation, and improved liveability (O'Donnell et al., 2020). Partnership management approaches identified in the literature reviewed include:

Learning and Action Alliance

Social learning (also Learning Action Alliance (LAA)) refers to changes in collective understanding from exchange of knowledge and experiences resulting in changes in practice (Ashley et al., 2012, Ensor and Harvey, 2015). LAAs are a response to calls for integrated solutions to 'wicked' / 'complex problems'; problems that cannot be solved by science or top-down governance and are beyond the remit of individual stakeholders or organisations (O'Donnell et al., 2020a). Rooted in organisational management theory, social learning is realised through knowledge co-production, collaboration, and collective action of multiple stakeholders to support better outcomes (Reed et al., 2010). There is increasing interest towards social learning to help provide timely, adaptive, systemic, transformative water governance (Ashley et al., 2012, Johannessen and Mostert, 2020,). This implies that social learning could enable restructuring of current systems and serve as a governance or co-ordination mechanism to help cope with uncertainty and change (van Herk et al., 2011).

Case studies from the Netherlands (i.e., De Stadswerven and WestFlank) demonstrate how FRM has been supported by LAAs where FRM was integrated into urban planning processes (van Herk et al., 2011). The LAA brought together a broad range of stakeholders, including public, private and research partners, with interest and expertise steering and enabling a reframing of problems and the development of innovative solutions. The partnership also assisted in financial, political, legal and procedural support as a key part of governance activities. Some LAAs were funded by the Dutch research programmes: Living with Water (2010), Urban Flood Management Dordrecht (2008) and Building with Water (2008). Key driving policies included Spatial Planning procedures: Room for River and Dutch Water Act 2009. The Hungarian Tisza and German / Dutch Rhine integrated flood management case studies were also based on informal learning and collaborative networks from government bodies, the academic sector and NGOs (Pahl-Wostl et al., 2013).

In the UK, an example is drawn from Newcastle LAA where planners, developers, landowners, and engineers regularly meet to discuss integration of co-designed innovative Blue Green (BG) and Grey solutions, so the solutions can be incorporated into practice and policy (O'Donnell et al., 2020). Established in 2014, the LAA focuses on providing the evidence base and sharing integration of BG and Grey to move the city towards its ambition of becoming a BG city. In another UK example the Yorkshire and Humber partnership, used a multi-agency approach to deliver adaptive FRM via promoting social learning in line with Floods and Water Management Act 2010 (England and Wales). Membership included LAs, Environment Agency, Water Companies, Consultants and Universities (Ashley et al., 2012).

Polycentric Governance

Polycentric governance is a system where stakeholders across multiple levels, scales and sectors organise to form coexisting centres of decision-making that are formally independent of each other (Ostrom, 2010, Wells et al., 2017). The focus is cooperation at decision making levels. Polycentric systems are assumed to enhance innovation, learning, adaptation, trust and cooperation. It also focusses on risk reduction e.g., reduced risk of policy failure due to governance systems that have institutional diversity resistant to system change. This approach led to the success of NBS along the Isar River in Munich, Germany between 2000 -2011 (Zingraff-Hamed et al., 2019). Cooperation between multiple decision centres facilitated trust, learning and co design of a resilient landscape.

Public-private partnerships

Public sector and private partnerships are another common arrangement for water management initiatives (van Montfort et al., 2014). Lake Ringsjon Ronne catchment in Sweden (Martin et al., 2018) is an example of multi-level governance, cross-sector collaborations including bottom-up stakeholder engagement to improve catchment management outcomes driven by policy frameworks such as the Water Framework Directive. Thailand provides examples of partnerships in flood risk reduction (Disaster Risk Reduction) between local government and the private sector (ADPC'S NEWS, 2017). Leipzig, Germany NBS case study (Dushkova and Haase, 2020) and urban regeneration in Malmo, Sweden (TEN Group, 2010) provide further examples of public-private partnerships.

In the UK, the case study from Manchester is based on public-private partnerships to address a history of severe flooding (O'Sullivan et al., 2020). Sheffield demonstrates how cities can use collaborative planning and partnership approaches to integrate bottom-up citizen engagement in water management (Wild, 2017). The Living with Water partnership in Hull involves organisations responsible for water management (Yorkshire Water, Hully City Council, East Riding of Yorkshire Council, Environment Agency) and the University of Hull. Their focus is on building flood resilience and development of innovative water management systems (Living with Water, 2021). Outwith the water sector, a study by Gorissen et al.,

(2018) focused on accelerating sustainable low carbon transitions in Genk (Belgium) provides an example of public-civic partnership arrangements where volunteers and the government bring together partners in different nature and food domains.

Governance experimentation

Governance experimentation draws from collaborative planning, participation and social learning (Bos and Brown, 2012). An example of this partnership approach is drawn from the urban water sector in the Cooks River catchment in Sydney (Australia). The bottom-up experimentation governance process was led by two individuals - champions unhappy with a lack of a coordinated approach to addressing problems within the catchment. The intention of the champions was to develop effective partnerships for sustainable urban water management through improved governance arrangements. The 10-year experimental governance approach united municipalities as they recognised their combined strength in addressing issues to secure state funding.

Success factors and barriers for collaborative partnership working

Factors for successful partnership arrangements are based on indicators such as solutions delivered, effectiveness of partnerships and continued existence. Success is also influenced by underlying governance system reflecting key elements of the OECD principles on water governance such as funding mechanisms and legislative frameworks**.** Understanding barriers and challenges to effective partnership working is fundamental to adaptive management approaches, allowing systems to continuously improve, as opposed to undergoing continuous reform.

As an example, the Swedish city Malmö, often cited as an exemplar in sustainable urban regeneration (TEN Group 2010, Sörensen 2021), a recent review of regeneration initiatives highlighted challenges to partnership arrangements. Johannessen and Mostert (2020), assessed urban planning and decision-making process related to critical water issues. They identified several social and institutional learning barriers to realising green and adaptive goals. These are summarised:

- Lack of finances – lack of cost and benefit sharing among stakeholders or within municipality departments limits activities to their own budgets.
- Silo working – fragmented working culture with stakeholders / partners focusing on institutional culture and routines.
- Awareness and understanding – for example not highlighting (NBS) benefits and consequences to politicians and lack of continuity related to staff turnover (capacity, time and skills) resulting in loss of experience.
- Different priorities among different partner organisations / stakeholders – the need to deliver on mandated work discourages collaboration and innovation for other interventions resulting in project fatigue overtime.
- Lack of legislation and overlapping policies – these lead to goal conflicts among partner organisations / stakeholders. For example, the Planning and Building Act in Sweden was amended in line with the climate adaptation strategy but only regulates new developments.
- Unequal distribution of benefits from implemented interventions and lack of stakeholder participation – local stakeholders / local communities perceive their interests as not being considered and not serving their needs. For example, some interventions lead to displacement of original residents as property prices and rents increase following intervention implementation.
- Lack of data and information sharing between private and public entities resulting in mistrust and limited collaboration.

References

ADPC'S NEWS. (2017). *ADPC working towards Public-Private Partnerships for flood risk reduction in Thailand* [Online]. Available: https://www.adpc.net/igo/contents/media/media-news.asp?pid=1215&topic= [Accessed 26 February 2021].

Akhmouch, A. and Correia, F.N. (2016). The 12 OECD principles on water governance - When science meets policy. Utilities Policy 43 (2016) 14-20. https://doi.org/10.1016/j.jup.2016.06.004

Arnstein, S. R. (1969). A Ladder Of Citizen Participation. *Journal of the American Institute of Planners,* 35**,** 216-224.

Ashley, R. M., Blanskby, J., Newman, R., Gersonius, B., Poole, A., Lindley, G., Smith, S., Ogden, S. & Nowell, R. (2012). Learning and Action Alliances to build capacity for flood resilience. *Journal of Flood Risk Management,* 5**,** 14-22.

Avello, P., Beane, B., Birtillt, K., Bristow, J., Bruce, A., Ellis, L., Fisher, S., Fletcher, M., Karmann, C., Gine, R., Jiménez, A., Leten, J., Pharr, K., Romano, O., IRuiz-Apilánez, I., Saikia, P., Shouler, M., Simkins, P. (2019). City Water Resilience Approach: Literature Review. The Resilience Shift, ARUP. https://www.resilienceshift.org/publication/city-water-resilience-approach-literature-review/ [Accessed February 2022]

Bayrak, M., Hsu, Y.-Y., Hung, L.-S., Tsai, H.-M. & Vayayana, T. (2020). Global Climate Change and Indigenous Peoples in Taiwan: A Critical Bibliometric Analysis and Review. *Sustainability,* 13**,** 29.

Berkes, F. (2017). Environmental Governance for the Anthropocene? Social-Ecological Systems, Resilience, and Collaborative Learning. Sustainability, 9, 1232.

Bos, J. J. & Brown, R. R. (2012). Governance experimentation and factors of success in socio-technical transitions in the urban water sector. *Technological Forecasting and Social Change,* 79**,** 1340-1353.

Butler, C., and Pidgeon, N. (2011). From `flood defence' to `flood risk management': exploring governance, responsibility, and blame. Environment and Planning C: Government and Policy 2011, volume 29, pages 533 - 547

Chaffin, B., Gosnell, H. & Cosens, B. (2014). A decade of adaptive governance scholarship: Synthesis and future directions. *Ecology and Society,* 19.

Collins, R., Johnson, D., Crilly, D., Rickard, A., Neal, L., Morse, A., Walker, M., Lear, R., Deasy, C., Paling, N., Anderton, S., Ryder, C., Bide, P., Holt, A. (2020). Collaborative water management across England – An overview of the Catchment Based Approach. Environmental Science and Policy 112 (2020) 117–125

Couper, G., Bullen, A., Bottoms, I. (2019). Encouraging collaboration across policy domains. CAG Consultants, on behalf of ClimateXChange. Available at: https://www.climatexchange.org.uk/media/3870/cxc-encouraging-collaboration-across-policy-domains.pdf [Accessed February 2022]

Da Silva, C., Sutherland, A. & Green, C. (2008). Learning Alliance Briefing Note 14: Water governance for integrated urban water management. SWITCH Urban Water Project. Available at: http://switchurbanwater.lboro.ac.uk/outputs/pdfs/WP6-2_BRN_14_Governance.pdf [Accessed February 2022]

Djalante, R. (2012). Review Article: Adaptive governance and resilience: the role of multi-stakeholder platforms in disaster risk reduction. *Natural Hazards and Earth System Sciences,* 12**,** 2923-2942.

Dushkova, D. & Haase, D. (2020). Not Simply Green: Nature-Based Solutions as a Concept and Practical Approach for Sustainability Studies and Planning Agendas in Cities. *Land,* 9**,** 19.

Ensor, J. & Harvey, B. (2015). Social learning and climate change adaptation: evidence for international development practice. *WIREs Climate Change,* 6**,** 509-522.

Fraser, A. and Kirbyshire, A. (2017). Supporting governance for climate resilience: Working with political institutions. London: Overseas Development Institute.

Gorissen, L., Spira, F., Meynaerts, E., Valkering, P. & Frantzeskaki, N. (2018). Moving towards systemic change? Investigating acceleration dynamics of urban sustainability transitions in the Belgian City of Genk. Journal of Cleaner Production, 173, 171-185.

Grant, G. & Gedge, D. (2019). Living Roofs and Walls: from Policy to Practice; 10 years of urban greening in London and Beyond. London: Greater London Authority.

Howlett, M., Ramesh, M. & Wu, X. (2015), Understanding the persistence of policy failures: The role of politics, governance and uncertainty, Public Policy and Administration. https://doi.org/10.1177/0952076715593139

Johannessen, Å. & Mostert, E. (2020). Urban Water Governance and Learning—Time for More Systemic Approaches? *Sustainability,* 12**,** 6916.

Lawrence, P. (2020). The city of Edinburgh Council, Transport and Environment Committee Vision for Water Management. Available at: https://democracy.edinburgh.gov.uk/mgConvert2PDF.aspx?ID=28758 [Accessed February 2022]

Lebel, L., Anderies, J. M., Campbell, B., Folke, C., Hatfield-Dodds, S., Hughes, T. P. & Wilson, J. (2006). Governance and the capacity to manage resilience in regional social-ecological systems *Ecology and Society,* 11.

Living With Water. (2021). *Living with Water* [Online]. UK. [Accessed 28 April 2021]. https://livingwithwater.co.uk/ [Accessed February 2022]

Lockwood, M., Davidson, J., Curtis, A., Stratford, E. & Griffith, R. (2010). Governance Principles for Natural Resource Management. *Society & Natural Resources,* 23**,** 986-1001.

Martin, R., Blandon, A., Hellquist, K. F. & Schluter, M. (2018). Report Case Study 6: Understanding eutrophication processes and restoring good water quality in Lake Ringsjon and Ronne Catchment in Kattegat, Sweden. Aquacross.

Mottaghi, M., Kärrholm, M. & Sternudd, C. (2020). Blue-Green Solutions and Everyday Ethicalities: Affordances and Matters of Concern in Augustenborg, Malmö. *Urban Planning,* 5**,** 132-142.

OECD. (2011). Water Governance in OECD Countries: A Multi-level Approach. ISBN:9789264119284.OECD, (2015). OECD Principles on Water Governance. https://www.oecd.org/cfe/regionaldevelopment/OECD-Principles-on-Water-Governance.pdf [Accessed February 2022]

OECD. (2018). *Implementing the OECD Principles on Water Governance: Indicator Framework and Evolving Practices,* OECD Studies on Water, OECD Publishing, Paris*, https://doi.org/10.1787/9789264292659-en*

OECD. (2021). OECD Principles on Water Governance: From policy to practice. Policy Brief IWRA Water International ; 16 ; June 2020. Routledge. Available at : www.iwra.org/wp-content/uploads/2020/06/PB16-June-2020-final-v2.pdf [Accessed February 2022]

O'Donnell, E.C. and Thorne, C.R. (2020) Drivers of future urban flood risk. Phil.Trans. R. Soc. A 378: 20190216. http://dx.doi.org/10.1098/rsta.2019.0216 .

O'Donnell, E., Thorne, C., Ahilan, S., Arthur, S., Birkinshaw, S., Butler, D., Dawson, D., Everett, G., Fenner, R., Glenis, V. (2020a). The blue-green path to urban flood resilience, Blue-Green Systems, 2, 1, 28-45, IWA Publishing.

Olsson, J. A., Brunner, J., Nordin, A. & Hanson, H. I. (2020). A just urban ecosystem service governance at the neighbourhood level- perspectives from Sofielund, Malmö, Sweden. Environmental Science & Policy, 112, 305-313.

Ostrom, E. (2010). Polycentric systems for coping with collective action and global environmental change. *Global Environmental Change,* 20**,** 550-557.

O'Sullivan, F., Mell, I., Clement, S. (2020). Novel Solutions or Rebranded Approaches: Evaluating the Use of Nature-Based Solutions (NBS) in Europe. Frontiers in Sustainable Cities, Volume 2 | Article 572527. doi: 10.3389/frsc.2020.572527.

Pahl-Wostl, C., Becker, G., Knieper, C. & Sendzimir, J. (2013). How Multilevel Societal Learning Processes Facilitate Transformative Change: A Comparative Case Study Analysis on Flood Management. *Ecology and Society,* 18.

Reed, M., Evely, A., Cundill, G., Fazey, I., Glass, J., Laing, A., Newig, J., Parrish, B., Prell, C., Raymond, C. & Stringer, L. (2010). What is Social Learning? *ECOLOGY AND SOCIETY,* 15**,** r1.

Romano, O. & Akhmouch, A. (2019). Water Governance in Cities: Current Trends and Future Challenges. *Water,* 11**,** 500; doi:10.3390/w11030500

Sörensen, J. (2021). Basement floods in Augustenborg and Malmö. In M. Månsson, & B. Persson (Eds.), The Eco-City Augustenborg: Experiences and lessons learned (pp. 214-215). (Arkus). Malmö, Sweden.

TEN Group (2010). Learning from Copenhagen and Malmo. London: Urban and Economic Development Ltd.

Zingraff-Hamed, A., Juliette, M., Lupp, G., Joanne, L.-B. & Pauleit, S. (2019). Designing a Resilient Waterscape Using a Living Lab and Catalyzing Polycentric Governance. 7**,** 12-31.

Van Herk, S., Zevenbergen, C., Ashley, R. & Rijke, J. (2011). Learning and Action Alliances for the integration of flood risk management into urban planning: a new framework from empirical evidence from The Netherlands. *Environmental Science & Policy,* 14**,** 543-554.

Van Montfort, C., Michels, A. & Frankowski, A. (2014). *Governance models and partnerships in the urban water sector. A framework for analysis and evaluation*.

Wells, J., Labadz, J.C., Smith, A., Md. Islam, M., (2017). Barriers to the uptake and implementation of natural flood management: A social-ecological analysis. J Flood Risk Management. 2019;e12561; https://doi.org/10.1111/jfr3.12561

Wild, T. (2017). *Urban waterways strategy and action plan* [Online]. UK. Available: https://urbact.eu/urban-waterways-strategy-action-plan [Accessed 29 April 2021].

Wesselink, A, Warner, J.F, Syed, M.A, Chan, F, Tran, D.D, Huq, H., Huthoff, F., Le Thuy, N., Pinter, N., van Stavern, M.F., Wester, P., Zegwarard, A. (2015). Trends in flood risk management in deltas around the world: Are we going 'soft'? International Journal of Water Governance, Volume 3(4), 25–46. doi:10.7564/15-IJWG90

Annex 1.3 The MGSDP review: Supplementary information

The following is supplementary MGSDP review information related to tracking the evolution of the Partnership and noted impacts on Water Policy, guidance and best practice as found in the literature.

Evolution – Partnership organisation, function, and challenges

Glasgow was known to be flood-prone, having rapidly expanded along the River Clyde corridor during the industrial period alongside an inadequate sewer system and bottleneck drainage with associated overland flows (Greeman 2004, Macdonald and Jones 2006). The extent of flooding and damage caused by the 2002 flooding was a setback for planned extensive redevelopment across the Metropolitan. Both Scottish Water (SW) and Glasgow City Council (GCC) were under pressure to identify solutions from residents, planners, and politicians. This required lateral thinking about soft engineering that could be integrated with hard infrastructure (Greeman, 2004).

Key objectives at the time to support an holistic approach to cost-effectively address infrastructure legacy issues were: **Flood Risk Reduction**: watercourses and sewers as climate change predictions would increase frequency and scale of impact; **Environmental Water Quality Improvements**; modified watercourses with culverts replacing open channels and numerous combined storm overflow (CSO) failures; **Removal of Development Constraints**: drainage capacity compromised economic development; **Habitat Improvements**: regeneration provided opportunities with SUDS and habitat / amenity enhancement in areas where it was much needed; **Surface Water Management**: linked to green corridors and functional greenspaces for improved placemaking; **Integrated Investment Planning:** levels of investment required needed to be understood to allow stakeholders to secure financial support. A four-stage approach was adopted to deliver the GSDP (Cashman 2007) (Table 2).

Table 2: GSDP Stages (after Page and Fleming, 2005; Jefferies at al., 2009 and Ellis, 2009)

GSDP Stage 1	GSDP Stage 2	GSDP Stage 3	GSDP Stage 4
• GSDP wide Supporting Studies • Initial SDP for East End / Dalmarnock • Consideration of hard and soft solutions	• Initial SDP for 4 WwTW catchments • Initial Clyde WQM • UPM Initial Planning Study • Associated Studies • Stage 3 Recommendations	• Detailed Masterplan • Model Refinement • Detailed WQM/UPM • SWMPs • Engineering Feasibility • Preliminary designs	• Design, Construct, Commission Schemes • Stakeholder discussion / consultation on future investment, planning and delivery mechanisms • Publish Achievement
Completed 2004	**Partially Completed 2008**	**Scheduled for completion 2009**	**Scheduled for completion 2014**

Stage 1 investigated drainage and flooding issues using the East End / Dalmarnock sub-catchment as a pilot for typical extreme drainage issues experienced across the metropolitan (e.g., ~80% of culverted watercourses passed through green spaces). An integrated watercourse and sewer model delivered understanding and quantification of the problems for the first time: flooding; CSO impacts; culverted watercourse (habitat and amenity loss), development constraints; climate change. The Partners worked together to find the best solutions to facilitate ambitions to unlock development constraints for the regeneration of Glasgow as a City for the 21st Century (Adshead, 2006). A geospatial planning approach to SWM was considered a core solution (Akornor and Page, 2004, MacLachlan and Margetts, 2012).

Stage 2 extended Stage 1 to provide the Metropolitan Glasgow masterplan spanning all four Glasgow WwTW catchments including targeted surface water management plans (SWMPs) and urban pollution management studies for the River Clyde and major tributaries (Page and Fleming, 2005, Ellis, 2009). Stage 3 delivered a master plan for catchment wide SWMPs with design and implementation to be rolled out to 2025 (Stage 4). The SWMPs would introduce resilience to drainage infrastructure including green corridors and source control in the form of highway rain gardens and street planters to manage exceedance flows (Macdonald and Jones 2006, Ellis 2009, Mackay 2019).

An independent technical review in 2008 aimed to provide confidence that outputs provided information that major decisions could be made and reassure the Water Industry Commissioner (WIC) for Scotland and Scottish Government that projects were undertaken in a competent manner. The review supported the partnership approach, concluding that project

delivery followed best practice and was value for money. A key recommendation was that a Project Management Office (PMO) be established to provide top level coordination and sustain momentum gained (Jefferies et al., 2009).

Since 2008, the partnership has grown to include Scottish Enterprise, Clydeplan, South Lanarkshire Council (2009), Scottish Canals (2012), Renfrewshire Council (2014), East Dunbartonshire Council, North Lanarkshire Council and Network Rail (2015). As the partnership has learned how to collaborate successfully and with changing national and local pressures such as the climate and biodiversity crises, health and wellbeing, active travel and placemaking, the MGSDP is engaging with key stakeholders in these sectors to integrate strategies i.e., Central Scotland Green Network, Climate Ready Clyde, Scottish Forestry, Glasgow & Clyde Valley Green Network, Nature Scot and Transport Scotland.

Impacts on water policy, legislation and urban water management best practice

McDonald and Jones (2006), Ellis (2009) and Dolowitz et al., (2018) undertook research into the development of the GSDP and drainage infrastructure modernisation to investigate the use of SuDS and the interdisciplinarity of urban drainage management. Ellis found the GSDP to be *"an innovative and challenging planning-led approach dealing with a complexity of issues related to the control, treatment and management of urban drainage. The multi-agency approach facilitated stakeholder integration that benefits the environment and local communities*. This statement illustrates that the MGSDP were already developing collaborative practices that would later align with the OECD key dimensions of water governance drivers, particularly 'efficiency' and 'trust & engagement'. However, Ellis also noted that until maintenance *"issues are resolved it will be difficult to ensure a more general roll-out of SuDS"* indicating that the effectiveness dimension had to be developed in the form of adequate capacity.

The FRM (Scotland) Act 2009 (Scottish Government, 2019) highlighted the MGSDP as a partnership that other local authorities and agencies should consider for effective delivery of SWM projects. The MGSDP received National Planning Framework 3 status (NFP3 AP, 2015), whereby it was considered an essential national development required for Scotland's future (Scottish Government, 2014). Other partnerships have been inspired by the MGSDP success (e.g., Edinburgh and Lothians Strategic Drainage Partnership).

At Scottish Water's 'Glasgow Investment' launch in 2013, the power of the partnership is described by SW Asset Management Director again highlighting the OECD 'efficiency' and 'effectiveness' drivers achieved by the partnership: *"By working with our MGSDP partners, we have been able to find integrated drainage solutions for the future which will provide knowledge and experience that can be used across the rest of Scotland, with the Glasgow area being seen as a template of good practice"*.

The United Nations Global Assessment Report on Disaster Risk Reduction (UNISDR, 2015) promotes integration of disaster risk management into development; managing risks cost less than managing disasters. Inequity and disaster risk are discussed in Calton, Glasgow (Lindley et al., 2011) where small watercourses and ageing sewage systems meant that flooding regularly occurred. During the 2002 floods, Calton was one of the worst affected areas and it was noted that the MGSDP, via the White Cart Flood Alleviation Scheme, implemented flood risk reduction measures that also enabled regeneration.

Ravetz and Connelly (2018) reviewed water governance in Manchester to provide recommendations for greater integration across the areas of water quality and quantity. MGSDP was one of two case studies identified as best practice, the other being Newcastle LAA. Tangible outcomes of the partnership include the drainage masterplan and City Region Deal funding for implementing improvement works with key lessons learnt being that partnerships take time to develop trust and understanding; there is a long lead in time to understand the problems and develop a shared vision; and understanding the links between water and the economy have enabled funding to be leveraged to implement projects.

In 2018, Scottish Water launched its Storm Water Strategy aimed at delivering more sustainable approaches to surface water to reduce flood risk, such as managing runoff above ground, to ensure the sewer network is better able to adapt to existing pressures and climate change (Water Briefing, 2018). SW relationship and negotiations as an MGSDP partner has encouraged this new approach.

At an industry led conference, McKay (2019) describes lessons learnt delivering SWMPs in Glasgow highlighting that the MGSDP partnership working had avoided duplication of effort, pooled expertise and shared costs for projects to deliver integrated solutions and multiple benefits. Challenges with community engagement, an integral part of SWMPs (e.g., 'Rain Ready in Glasgow'), and how they were overcome was discussed by e.g., amending strategies to reach affected communities and simplifying technical information to educate the public such as water depths in SuDS using an old bathtub.

García-Lamarca and Gray (2020) discuss urban environmental justice (gentrification) and challenges with green redevelopments that create new homes for higher income residents. Focussing on the Sighthill and Hamiltonhill areas of the smart canal and displacement of residents including reduction in social housing provision, public consultations is described as 'tokenistic arts-based activities'. Oscilowicz et al., (2021) later reviewed the critique from the lens of right to return offered by GCC and housing association partners concluding there was room for improvement to prevent communities from changing completely when new housing stock was built.

The Institution of Civil Engineers State of the Nation report for Scotland (ICE, 2020) demonstrates the urgent requirement for 'climate ready' infrastructure in Scotland. The Smart Canal is showcased for delivering infrastructure that is resilient, sustainable and supportive of wellbeing.

References

Adshead, A. (2006). Glasgow Strategic Drainage Plan dealing with the legacy and providing for the future. Water Projects Online. Available at: https://waterprojectsonline.com/wp-content/uploads/case_studies/2006/Glasgow-Strategic-Drainage-Plan-2006.pdf [Accessed February 2022]

Akornor, O., Page, D.W. (2004)., Glasgow Strategic Drainage Plan Stage 1. In *Proceedings of WaPUG Conf.,*

Cashman, A. (2007). Sustainable Flood Risk Management: A Glasgow Case Study - from paralysis to praxis? Flood Risk Management Research Consortium. http://fcerm.net/resource/sustainable-frm-glasgow-case-study-paralysis-praxis [Accessed February 2022]

Dolowitz, D., Bell S., Keeley, M. (2018). Retrofitting urban drainage infrastructure: green or grey? Urban Water Journal, 15:1, 83-91, DOI: 10.1080/1573062X.2017.1396352

Ellis, B.J. (2009). The Glasgow Strategic Drainage Plan, in Ferrier R. C., Jenkins, A. (eds), *Handbook of Catchment Management*, Wiley-Blackwell, 978-1-444-30768-9

García-Lamarca, M, and Gray, N. (2020). What will Glasgow's Smart Canal Mean for its Historically Deprived Communities? BCNUEJ December 2020, http://www.bcnuej.org/2020/12/02/what-will-glasgows-smart-canal-mean-for-its-historically-deprived-communities/ [Accessed February 2022]

Grenman, A. (2004) Glasgow drain brains, New Civil Engineer, July 2004. Available at: https://www.newcivilengineer.com/archive/glasgow-drain-brains-01-07-2004/ [Accessed February 2022]

ICE (Institution of Civil Engineers) Scotland (2020). State of the Nation Report 2020: Climate Ready Infrastructure. Available at: https://www.ice.org.uk/getattachment/about-ice/near-you/uk/scotland/publications/ice-scotland-state-of-the-nation-report-2020/scotland-state-of-the-nation.pdf.aspx [Accessed February 2022]

Jefferies, C., Duffy, A., Coghlan, B. (2009). The Metropolitan Strategic Drainage Partnership Final Report Glasgow Strategic Dranage Plan & Clyde Gateway Integrated Water Plan – Independent Review. Unpublished / Confidential Report.

Lindley, S., O'Neill, J., Kandeh, J., Lawson, N., Christian, R., O'Neill, M. (2011). Climate change, justice and vulnerability. Joseph Rowntree Foundation. November 2011. ISBN: 978-1-85935-865-8.

Macdonald, N., Jones, P. (2006) The inclusion of sustainable drainage systems in flood management in the post-industrial city: A case study of Glasgow, Scottish Geographical Journal, 122:3, 233-246, DOI: 10.1080/00369220618737268

MacLachlan, I., Margetts J. (2012). Integrated Urban Drainage modelling in Scotland - practical considerations and case studies. CIWEM & WaPUG Scottish Symposium, April, Glasgow. http://ftp2.ciwem.org/2012/2012%2020_%20Scottish%20Symposium%20Glasgow%20April%202012/Scottish_Paper%206_Presentation%20by%20I.McLachlanJ.Margetts_190412.pdf [Accessed February 2022]

McKay, G. (2019). Delivering Surface Water Management Plans in Glasgow: Lessons Learnt. CIWEM UDG Summer Conference 2019.

National Planning Framework 3 Action Programme (NPF3 AP), (2015). Accessed Online 10.08.20: https://npfactionprogramme.com/national-developments/ [Accessed February 2022]

National Planning Framework (NPF), (2021). Call for ideas, Organisations – Responses, 135-the_metropolitan_glasgow-strategic development-partnership. Available: https://www.transformingplanning.scot/media/1555/135-the-metropolitan-glasgow-strategic-development-partnership.pdf [Accessed February 2022]

Oscilowicz, E., Lewartowska, E., Levitch, A., Luger, L., Hajtmarova, S., O'Neill, E., Planas Carbonell, A., Cole, H., Rivera Blanco, C., Monroe, E. (2021). Policy and planning tools for urban green justice. BCNUEJ April 2021. Available at: http://www.bcnuej.org/wp-content/uploads/2021/04/Toolkit-Urban-Green-Justice.pdf [Accessed February 2022]

Page D.W., Fleming, N. (2005). Glasgow Strategic Drainage Plan – Stage 2. CIWEM Conf., August 2005. Blackpool. http://ftp2.ciwem.org/2005/2005%202_Autumn%20Blackpool%202005/A2005fleming.pdf [Accessed February 2022]

Ravetz, J, and Connelly, A. (2018). Review of water governance in Greater Manchester: Report to the Natural Course project steering group, Oldham, Oldham MBC.

Scottish Government (2014). National Planning Framework 3, Accessed Online 10.08.20: https://www.gov.scot/publications/national-planning-framework-3/ [Accessed February 2022]

Scottish Government (2019). Protecting Scotland's Future The Government's Programme for Scotland 2019-20. ISBN: 978-1-83960-127-9

UNISDR (2015). Making Development Sustainable: The Future of Disaster Risk Management. Global Assessment Report on Disaster Risk Reduction. Geneva, Switzerland: United Nations Office for Disaster Risk Reduction (UNISDR). ISBN 978-92-1-132042-8.

Water Briefing (2018). Scottish Water unveils new storm water strategy to address long-term sewer flooding risk. Available at https://www.waterbriefing.org/home/flooding/item/14833-scottish-water-unveils-new-storm-water-strategy-to-address-long-term-sewer-flooding-risk?font-size=larger [Accessed February 2022]

Annex 1.4 Literature initial findings and discussion supplementary information

Findings from these reviews show that several requirements are satisfied when considering the attributes for successful collaborative partnerships. There is no doubt that the partnership has achieved a great deal not only with sustaining a collaborative culture for two decades but also the successful delivery of projects and associated multiple benefits that contribute to adaptive and resilient communities across the Metropolitan area. A successful collaborative culture has been achieved to deliver the co-designed strategy reflecting individual stakeholders' ambitions. The Partnership has also influenced legislation and national guidance and has led the way for similar partnerships in Scotland.

There is an increasing urgency for organisations to focus on sustainability and resilience in response to climate related challenges in cities around the world. Organisations are reframing strategies driven by new local and global values and principles (Burnes, 2017, Howieson et al., 2019). The MGSDP has grown to include key players from other sectors ensuring synergies between urban water management and current crises to pool knowledge, share ideas and funding to improve adaptability and resilience.

There have been positive steps regarding public involvement in the process of implementing new interventions to deliver on SWMPs primarily in retrofit situations. McKay (2019) describes overcoming technical barriers when engaging with the public however García-Lamarca and Gray (2020) report issues surrounding gentrification issues in areas related to the smart canal works.

Protests against polder construction in the Netherlands highlighted the importance of including the public at an early stage in development to uncover previously undefined solutions (Pahl-Wostl et al., 2013). Participation with local communities in design and implementation of SWM practices supports community resilience for climate related challenges. This form of social learning with communities for long term innovative approaches is a key finding for successful partnerships (O'Donnell et al., 2020).

Lack of community involvement is a barrier to widely informed, locally relevant issues such as flood risk. Resistance is often due to involvement too late in the planning process to be effective (White et al., 2007). Communities need to understand the implications of interventions as they come with sensitivities (Everett and Lamond 2014, Mottaghi 2020). Although participation takes time, this ensures acceptance of BGI interventions (García-Lamarca and Neil, 2020) encouraging codesigned innovative solutions (Zingraff-Hamed et al., 2019) and is key to a just urban governance (Olsson et al., 2020).

Use of incentives to encourage the involvement of the private sector in urban water management could also be considered for successful partnerships (Sörensen 2021). Implementation of green roofs and green walls in London, is mainly driven by the private sector. Although no subsidies or financial incentives were offered, interested developers included these initiatives as part of corporate social responsibilities and compensation plans for proposed new developments (Grant and Gedge, 2019).

From a visual perspective it is useful to reconstruct the MGSDP evolution pathway (Figure 3) using the Multi-Level Perspective (MLP) (Geels and Kemp 2000, Ehnert et al., 2018). This is a sustainability transition framework to help understand technical innovations from a socio-political perspective and the process of change and interactions at different socio-technical levels (Rip and Kemp 1998, Van der Brugge and Rotmans, 2007). The macro level is the external political or natural landscape that influences the pace of change at the meso and micro levels (Acheampong and Urama, 2016) i.e., trends such as climate change or extreme flooding as in the case of Glasgow. The meso level is the stable dominant regime, i.e., public bodies that control water systems including partnerships such as the MGSDP that influence change at the landscape level (Nastar, 2014). The micro level is protected space or 'niches' where innovative practices such as the MGSDP collaborative approach and new technologies (BGI, smart canal) develop without pressure, become accepted and 'business as usual' (Grin and Schott, 2010).

The 2002 floods were a shock change for the city resulting in the formation of the MGSDP that operates at all levels, laying the foundation and building blocks towards achieving the co-designed Vision. There have been several periods of disruptive change supporting the trajectory: 2005, Completion of a Metropolitan wide co-developed masterplan; 2012, renewed Vision and Objectives shaped by the Guiding Principles; and 2015, Securing City Deal funding reinforced commitment for collaborative working to deliver on aspirations for joined up sustainable solutions that are creating and enhancing natural environments, removing drainage constraints, and supporting economic development.

Legislative and regulatory support at the macro level (Sewers for Scotland Technical Guidance and SEPA Controlled Activity Regulations) were enabling factors, strengthening drivers to ensure sustainable drainage solutions via SWMPs. The recent

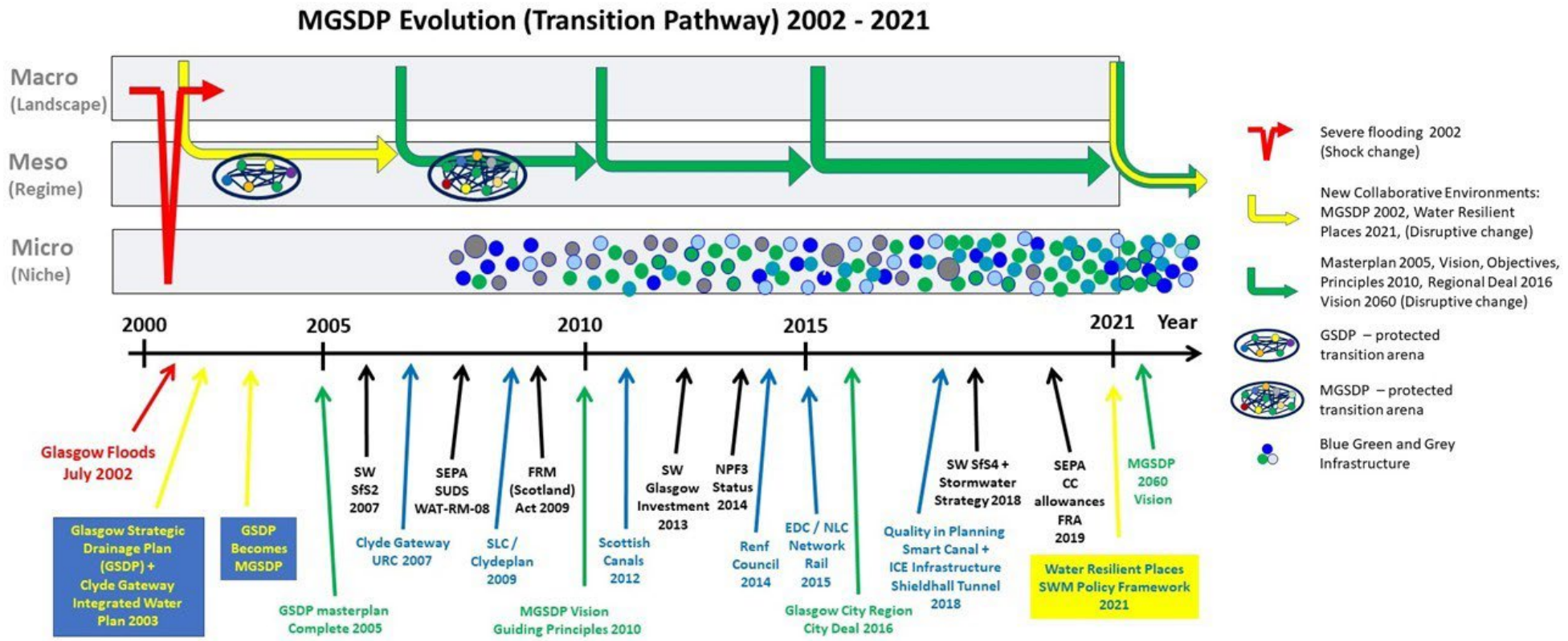


Figure 3: The MGSDP Evolution as a transition management pathway 2002 – 2021: legislative and regulatory influences, partnership development, and impacts (national exemplars / awards).

SW Stormwater Strategy to tackle flooding by removing rainfall from sewers will reduce complexity currently experienced for coordinated flood strategies, increase adaptability for future unknown climate challenges and encourage the inclusion of other domains into the water policy framework. SEPA (2019) Climate FRA Allowances in Land Use Planning supports a climate ready agenda further.

Current Scottish Government top-down strategic drivers will also strengthen collaborative working, particularly the policy framework for SWM and BGI to deliver water-resilient places in 'Protecting Scotland's Future' for net zero emissions to tackle the climate emergency (Scottish Government 2019, 2021b). This framework signposts The MGSDP as an exemplar for the development of drainage partnerships in tackling the issues of urban flooding and collaborative working.

For almost 20 years the MGSDP has adopted a systemic approach to strengthen and sustain the partnership with a steadily growing membership at the meso level to provide an effective transition arena (stakeholder platform). The MGSDP are guiding the modernisation and transformation of infrastructure to deliver climate change resilience. A strategic agenda has embedded a collaborative culture that appears to work across institutional silos, overcoming fragmented regulatory and funding mechanisms, and breaking down institutional barriers that exist in much of Europe (FAIR, 2019). The MGSDP encourages experimentation, nurturing innovative techniques (niches) for SWM that is reducing economic and social impacts of flooding and enabled unlocking of brownfield for development across the metropolitan to deliver economic growth – much of the attributes (Pillar 5) for Transformative capacity as presented in de Graaf-van Dinther's water resilient framework (2021). The challenge for the MGSDP moving forward to its next phase is to speed up the trajectory of transitioning from an adaptive capacity state (step by step approach) to a transformative capacity state (mainstreaming niches and practices) to address future societal changing drivers and truly deliver water resilient places that 'protect Glasgow's future'.

References

Acheampong, E.N. and Urama, K., (2016). Sustainable Urban Water System Transitions Through Management Reforms in Ghana. Water Resource Management, 30:1835–1849, DOI 10.1007/s11269-016-1256-3.

Burnes, B. (2017). After Paris: Changing corporate behaviour to achieve sustainability. *Social Business,* 7**,** 333-357.

De Graaf-van Dinther, R., (ed), (2021). Climate Resilient Urban Areas, Palgrave Studies in Climate Resilient Societies, https://doi.org/10.1007/978-3-030-57537-3_1

Ehnertt, F., Kern, F., Borgstrom, S., Gorissen, L., Maschmeyer, S., Egermann, M., (2018). Urban sustainability transitions in a context of multi-level governance: A comparison of four European states. J Env Innovation & Societal Transitions 26 (2018) 102-116, https://doi.org/10.1016/j.eist.2017.05.002

Everett, G. & Lamond, J. (2014). A conceptual framework for understanding behaviours and attitudes around 'Blue-Green' approaches to Flood-Risk Management.

FAIR. 2019 A perspective on the future of asset management for flood protection. A Policy Brief from the EU Interreg FAIR project. Available at: https://northsearegion.eu/media/8638/aw_interreg-policy_a4_web.pdf [Accessed February 2022]

García-Lamarca, M, and Gray, N. (2020). What will Glasgow's Smart Canal Mean for its Historically Deprived Communities? BCNUEJ December 2020, http://www.bcnuej.org/2020/12/02/what-will-glasgows-smart-canal-mean-for-its-historically-deprived-communities/ [Accessed February 2022]

Geels, F and Kemp, R (2000). Transitions from a societal perspective. UNU-MERIT Maastricht, The Netherlands.

Grant, G. & Gedge, D. (2019). Living Roofs and Walls: from Policy to Practice; 10 years of urban greening in London and Beyond. London: Greater London Authority.

Grin, J., Rotmans J., and Schot, J., in collaboration with Geels, F., Loorbach, D. (2010). Transitions to Sustainable Development New Directions in the Study of Long Term Transformative Change. KSI. Routledge. ISBN: 978-0-415-87675-9

Howieson, W. B., Burnes, B. & Summers, J. C. (2019). Organisational leadership and/ for sustainability: Future directions from John Dewey and social movements. *European Management Journal,* 37**,** 687-693.

McKay, G. (2019). Delivering Surface Water Management Plans in Glasgow: Lessons Learnt. CIWEM UDG Summer Conference 2019.

Mottaghi, M., Kärrholm, M. & Sternudd, C. (2020). Blue-Green Solutions and Everyday Ethicalities: Affordances and Matters of Concern in Augustenborg, Malmö. Urban Planning, 5, 132-142.

Nastar, M. (2014). What drives the urban water regime? An analysis of water governance arrangements in Hyderabad, India. Ecology and Society 19(2):57. http://dx.doi.org/10.5751/ES-06570-190257

O'Donnell E.C., Thorne C.R. (2020) Drivers of future urban flood risk. Phil.Trans. R. Soc. A 378: 20190216. http://dx.doi.org/10.1098/rsta.2019.0216

Olsson, J. A., Brunner, J., Nordin, A. & Hanson, H. I. (2020). A just urban ecosystem service governance at the neighbourhood level- perspectives from Sofielund, Malmö, Sweden. Environmental Science & Policy, 112, 305-313.

Pahl-Wostl, C., Becker, G., Knieper, C. & Sendzimir, J. (2013). How Multilevel Societal Learning Processes Facilitate Transformative Change: A Comparative Case Study Analysis on Flood Management. Ecology and Society, 18.

Rip, A. and Kemp, R. (1998). Technological Change. Human Choice and Climate Change. S. Rayner and E. Malone. Columbus, Ohio, Battelle Press. Volume 2: 327-399.

SEPA. (2019). Climate change allowances for flood risk assessment in land use planning. LUPS-CC1. https://www.sepa.org.uk/media/426913/lups_cc1.pdf [Accessed February 2022]

Scottish Government. (2019). Protecting Scotland's Future The Government's Programme for Scotland 2019-20. ISBN: 978-1-83960-127-9.

Scottish Government. (2021b). Water-Resilient Places A Policy Framework for Surface Water Management and Blue-Green Infrastructure. ISBN: 978-1-80004-613-9.

Sörensen, J. (2021). Basement floods in Augustenborg and Malmö. In M. Månsson, & B. Persson (Eds.), The Eco-City Augustenborg: Experiences and lessons learned (pp. 214-215). (Arkus). Malmö, Sweden.

Van der Brugge, R., and Rotmans, J. (2007). "Towards transition management of European water resources." Water Resources Management, 21(1), 249-267.

White, I., Richards, J., Carter, J. (2007). FRM Policy Issues, Vol 2, Urban. FRMC Research Report UR8. www.floodrisk.org.uk

Zingraff-Hamed, A., Juliette, M., Lupp, G., Joanne, L.-B. & Pauleit, S. (2019). Designing a Resilient Waterscape Using a Living Lab and Catalyzing Polycentric Governance. 7, 12-31.

Annex 2.1 Stakeholder Consultation Methodology

Data were obtained via face-to-face structured interviews with MGSDP core partners flood risk management leads in cities / areas across Scotland and an online survey with flood risk management practitioners. The interview questions were open ended with survey questions being a mix of open ended and closed questions (Cresswell, 2014). Questions were grouped into three themes: partnership management and governance structure; barriers and challenges to collaborations; and collaborations going forward. A fourth theme was introduced to encourage respondents to reflect and consider implications for partnerships going forward – for the MGSDP and new drainage related partnerships based on their experiences. Each theme had several prompt or nudge questions based on the OECD water governance drivers and principles to encourage the dialogue or obtain clarification if needed. Interview questions are provided as Interview Schedules 1-2 below.

Interviews were recorded and anonymised at the earliest stage prior to professional transcription including identifiable text such as location and partner organisation. Data from the interviews, online survey and workshops were analysed using NVivo software, applying thematic coding and categorisation for emerging themes. The analysis used an inductive approach where the coding and theme generation was directed by the content of the data (Braun & Clarke, 2006; Saunders et al., 2009).

Thematic analysis involved the inductive coding of qualitative data into clusters of similar entities, or conceptual categories and the identification of consistent patterns and relationships between themes. The NVivo coding of main themes is shown in Data Analysis below along with the number of references to each of the themes throughout the stakeholder consultation phases (interviews, online survey and workshops). These themes and emerging sub-themes are explored in the following sections. NVivo was also used to explore the relationships between the themes (nodes) and the interviewees both within MGSDP and between MGSDP and FRML. This understanding was used to develop the themes and the narrative found below and in Section 3 'Stakeholder Consultation' in the short report.

Members of FRM Community (FMRC) were also invited to participate via an online survey based on their knowledge and experience with the MGSDP and or FRM (**Survey Questionnaire 1**). Similar questions and themes were applied with several open-ended questions substituted for closed questions using a Likert scale to i.e., gauge familiarity with the MGSDP and elicit opinions on the collaborative approach.

All findings were presented in two half day workshops (again conducted via Microsoft Teams) held in June and July 2021. Invites were sent to all that had been invited to interview and completed the online survey. The workshop purpose was to present draft findings and lessons learnt including a round table debate with representatives to discuss if recommendations geared toward FRMC and the creation of similar partnerships are fit-for-purpose. The presentation (Annex 5) provided an overview of the project scope, research findings and preliminary recommendations for the MGSDP going forward; other collaborative drainage partnerships; and Water Management Policy. The workshop presentation can be found below (**Workshop Presentation 1**).

References

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology, Qualitative Research in Psychology, 3:2, 77-101, DOI: 10.1191/1478088706qp063oa

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches. Thousand Oaks, CA: SAGE Publications.

Saunders, M., Lewis, P. and Thornhill, A. (2009). Research Methods for Business Students. Pearson, New York.

Interview Schedule 1: MGSDP Partner

MGSDP Partner Details

- Name, role / timespan in the MGSDP and role / timespan in partner organisation.

Stakeholder Mapping Questions

- Who do you regularly communicate with in relation to the MGSDP (internal + external)?
- How often do you communicate?
- What types of interaction? (e.g. telephone, F2F, online meetings etc.)
- What types of information do you share? (e.g. email, reporting etc.)

Vision, Objectives and Guiding Principles

- Which Objectives and Guiding principles are you most familiar with?
- What is most relevant to your organisation and what ultimately is the biggest driver?

Partnership Management and Governance.

- What is the partnership governance approach? e.g.,

  Funding / fiscal arrangements for partnership management? Facilitation of policy / legislation alignment to enable delivery of solutions – e.g., advice on legal agreements, terms of reference between partners? How are partner institutional goals managed / influenced for planning and cross sectoral land use policies to deliver joined up strategies? How does MGSDP influence or enable individual partner resource management to deliver solutions (e.g. funding / budget cycles)? Clear frameworks for vesting and long-term management of partnership solutions?

- How would you describe management of the partnership?

  e.g. What is the MGSDP role in decision making? How are partners kept involved?

- How do you feel about the partnership management process?

  e.g. Do you have a clear role and are your skills used effectively? If not, how so?

- Do you think there is added value from the partnership approach? If so, please describe?

Achievements and Impacts

- What would you say are the key achievements / impacts of the MGSDP?
- How has your organisation / work been influenced by the MGSDP?
- Do you think that the partnership approach is resulting in a shift in culture: e.g. partnership working is becoming 'business as usual' / 'the new norm'?
- What would you recommend as a good case study exemplifying influence / impact?
- Are you aware of any community engagement or post public perception studies?

Barriers and Challenges to the Partnership and the Delivery of Projects

- In your experience what are the main pitfalls or common barriers to be avoided?
- What big challenges / obstacles has the partnership faced and how were they overcome?
- What mistakes have been made and or avoided?

  e.g. What worked well and what didn't? Missed opportunities?

Going forward

- In your opinion are there any key lessons learned to date?
- Do you think the partnership has achieved or is achieving what it originally set out to do?
- What do you think would have happened if the MGSDP didn't exist?
- Is there anything you can think of where the MGSDP can improve or do better?

Do you have anything further to add?

Do you know any expert or organisation that you think we should consider for this review?

Interview Schedule 2: Flood Risk Management Lead

Stakeholder Details

- Role, City / Town.

MGSDP Vision, Objectives and Guiding Principles

- Which Objectives and Guiding principles are you most familiar with?
- What is most relevant to your organisation and what ultimately is the biggest driver?

Partnership Approach.

- Are you aware of any examples where the MGSDP approach has influenced or enabled decision making for a solution to be delivered? If so, please describe?
  e.g., advice on legal agreements, terms of reference between partners? Managing partner institutional goals / planning and cross sectoral land use policies to deliver joined up strategies? Resource management across partners to deliver solutions (e.g. funding / budget cycles)? Frameworks for vesting and long-term management of partnership solutions?
- Do you think there is added value from the MGSDP approach? If so, please describe?

Barriers and Challenges to the Partnership Approach and the Delivery of Projects

- In your experience, are you aware of challenges overcome or barriers avoided?
- In your opinion, what has worked well and what hasn't?
- Do you think there have been any missed opportunities?

MGSDP Achievements and Impacts

- What would you say are the key achievements / impacts of the MGSDP?
- Has your organisation / work been influenced by the MGSDP approach? Please describe.
- Do you think that in general a partnership approach such as the MGSDP is resulting in a shift in culture in the flood risk management community: e.g. partnership working is becoming 'business as usual' / 'the new norm'? If so, please provide an example.
- Could you recommend a good MGSDP case study? Pease briefly explain why.
- Are you aware of any MGSDP community engagement or post public perception studies?

Going Forward

- In your opinion are there any key lessons learned to date?
- Do you think the partnership has achieved or is achieving what it originally set out to do?
- What do you think would have happened if the MGSDP didn't exist?
- Is there anything you can think of where the MGSDP can improve or do better?

Do you have anything further to add?

Do you know any expert or organisation that you think we should consider for this review?

2.Which of the following objectives of the MGSDP are you familiar with?

	Not at all familiar	Slightly familiar	Somewhat familiar	Moderately Familiar	Extremely familiar
Flood risk reduction	○	○	○	○	○
River quality improvement	○	○	○	○	○
Enabling economic development	○	○	○	○	○
Habitat improvement	○	○	○	○	○
Integrated investment planning	○	○	○	○	○

3.Which of the following guiding principles of the MGSDP are you familiar with?

	Not at all familiar	Slightly familiar	Somewhat familiar	Moderately Familiar	Extremely familiar
Waterway Reconnections	○	○	○	○	○
Climate change ready	○	○	○	○	○
Blue-Green Networks	○	○	○	○	○
Keeping water on the surface	○	○	○	○	○
Design for extreme rainfall	○	○	○	○	○
Urban Biodiversity enhancement	○	○	○	○	○
Integrated Urban design	○	○	○	○	○
Sustainable Drainage Solutions	○	○	○	○	○

4.Do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Unsure	Agree	Strongly agree	Not Applicable
The MGSDP is well managed?	○	○	○	○	○	○
There is added value in the partnership approach used by MGSDP?	○	○	○	○	○	○

5.What do you think would have happened if the MGSDP didn't exist?

6.What would you say are the limitations of the MGSDP?

7.What would you say are the key achievements of the MGSDP?

8.Do you think the MGSDP has achieved its original aims and objectives?

9.Going forward, do you think the MGSDP can improve or do better?

10.Could the partnership approach (as used by the MGSDP) be used in other Scottish towns and cities?

Some questions about you.

11.Which organisation do you work for?

12.What is your position and main role in your organisation?

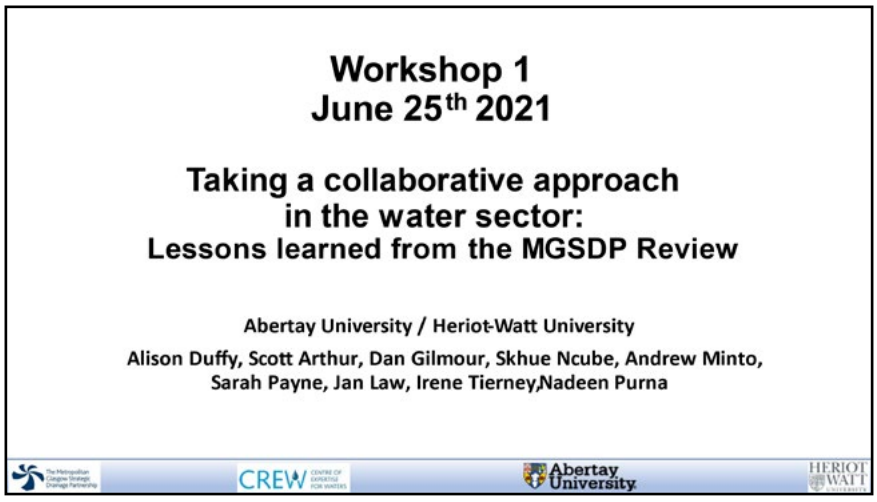
13.Have you had any interaction with the MGSDP? If yes, please provide details

14.Has the MGSDP helped your organisation deliver its objectives? If yes, please provide details

15.Are there any further comments you would like to make about the MGSDP?

16.Please leave your e-mail address if you would like a copy of the final project report.

Workshop Presentation 1



Content

- Project scope and expected outputs
- Key findings from Phase 1 reviews (collaborative partnerships and MGSDP)
- Key findings Phase 2 interviews and online survey
- Recommendations

Project scope

Summarise, assess, review the partnership since 2002 and provide recommendations on lessons learned in 3 areas:

- Recommendations for MGSDP – opportunities for partnership improvement and lessons learned from case study projects.
- Recommendations for practitioners and stakeholders in the FRM community with a focus on how similar partnerships may benefit other cities and regions in Scotland
- Recommendations for key areas of policy and regulation regarding the benefits of collaborative partnership approaches in the water sector.

Expected outputs / impacts

- inform future water management policy
- share with FRM practitioners to inform best practice on managing current and future flood risk and drainage challenges in urban areas
- help understanding of how an "infrastructure first" approach can contribute to creating great places
- MGSDP will consider findings and reflect upon the future shape, remit and resources for the partnership

Phase 1 International literature review on approaches to collaborative and cross-sectoral partnership approaches in the public sector

- i.e., review GOVERNANCE models
- Governance definition (OECD, 2011)
  "*administrative systems, with a focus on formal institutions (laws, official policies) and informal institutions (power relations and practices) as well as organisational structures and their efficiency*"
- 100+ papers screened for review, ~50 in detail to demonstrate the different attributes and arrangements of partnership approaches – focus down into attributes found in adaptive / resilience governance literature
- Many types of governance approaches (we won't bore you with detail)

Phase 1 literature review on approaches to collaborative and cross-sectoral partnership approaches in the public sector

Partnership success factors identified from case studies are based on different indicators, i.e.:

- Achievements
- Effectiveness of solutions delivered
- Continued existence

Findings show that success factors are influenced by the underlying governance system

Phase 1 literature review on approaches to collaborative and cross-sectoral partnership approaches in the public sector

Barriers and challenges common to most partnerships in reviewed case studies

Phase 1 Review of the MGSDP

Scope

- Examine the governance approach, structure and how the cross sectoral collaboration functions
- What were the drivers incl. changes in legislation and policy?
- Assess obstacles / barriers overcome to deliver projects
- Good and bad! (What worked well and what didn't)… Lessons for MGSDP and others to learn from
- Look at project types and impacts (case studies)
- What are the added benefits?

Review

- Mostly grey literature (online articles, newsletters, reports, blogs etc.) – 50+ reviewed – search terms MGSDP + guiding principles and objectives
- To answer most of the questions above, further research needed – consultation via interviews (Phase 2).

Phase 1 Review of the MGSDP

From the literature MGSDP has (these also align with the success factors identified **)**

- Created a collaborative culture to deliver FRM
- Influenced legislation / policy
  - Flood Risk Management (Scotland) Act 2009
  - NPF3 / NPF4 exemplars (2014)
  - Scot Govt policy framework (2021) - Water-resilient places, SWM and BGI Vision R18

    establish drainage partnershipsbluegreen cities and water resilience. Membership should include senior leaders of relevantorganisationsto make crosssector strategic commitments
- Reduced flooding and properties from the flood risk register
- Modernised drainage infrastructure across the Metropolitan area
- Improved water quality (CSOs, contaminated land, watercourse pollution)
- Unlocked land and opened up development potential
- Inspired other projects to take a partnership approach – Clyde Gateway, Smart Canal, ELSDP
- Increasing public participation as BGI projects
- Won recognition and award -winning projects – Athlete's Village (x3), Cuningar Loop, Cardowan SWMP, Sauchiehall St, Smart Canal, Halfway Community Park….

Phase 1 Review of the MGSDP – key governance and cross sectoral collaborative mechanisms - observations from literature

Governance

- Set up board / steering / technical groups with clear roles and mandates

Legislation

- Streamlined?
- Legal agreements and terms of reference between partners

Funding

- Fiscal arrangements to direct investment programmes/ funding of schemes
- Alignment of investment (and funding cycles) is difficult with the current funding set up between statutory bodies, MGSDP have found ways around for many schemes

Land use planning

- Consistency in cross boundary planning strategies? MGSDP influence is aligning across the Metropolitan areas

Phase 1 Review of the MGSDP

Project types and impacts from literature review

- 5 types of FRM measures (*Wesselink et al 2015*):
  - ✓ **prevention** (land use planning – i.e. SWMPs with quality greenspaces created across the city region)
  - ✓ **protection** (hard engineering)
  - ✓ **mitigation** (room for river)
  - ✓ **preparation** (warning systems)
  - ✓ **recovery** (rebuilding).
- Impacts - multiple objectives (re FRM Act 2009 and CLFRMP, 1st cycle)
  - ✓ Reduced flooding
  - ✓ Reduced economic damage
  - ✓ Avoided future flooding risk
  - ✓ Raised public awareness of flooding

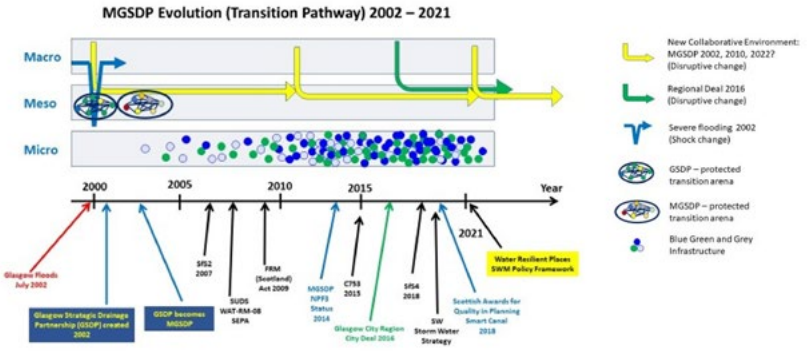
Prevention / Preparation
FRM Act (Scotland) 2009 + SWMP Guidance 2018. SWMPs - Integrated sewerage / drainage infrastructure Roadline + Flood warning scheme

Protection
Sewer improvements:
Eckford street, Shettleston,
Etive Crescent, Bishopbriggs
Kinning Park PS refurbishment
Daldowie WWTWinvestment

Mitigation
Nature and Environment
De-culverting historic watercourses
Greenspace initiatives / Green networks / SUDS e.g. the Seven Lochs Wetland Park

Recovery
SUDS - Regeneration / Retrofit / FAS
Clyde Gateway redevelopment
School Raingardens, Nth Lanks
Smart Canal project (NGIWMS)
Colquhoun Park FAS

Phase 1 Review of the MGSDP – legislative influences to deliver solutions



Phase 2 Questions and interviews undertaken

Interview Questions – 6 key Themes

MGSDP Vision, Objectives and Guiding Principles (familiarity / importance)

Partnership Approach.

- Are you aware of any examples where the partnership approach has influenced or enabled decision making for a solution to be delivered? If so, please describe?
- Do you think there is added value from the MGSDP approach? If so, please describe?

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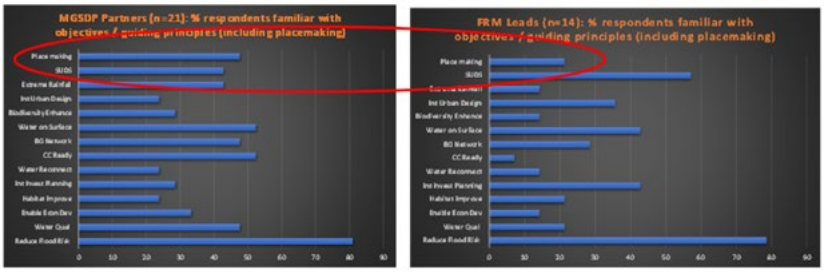
	MGSDP Partner	Role
1	MGSDP	PMO
2	SG	Current Steering Group / Board
3	Scottish Canals	Current Steering Group / Board
4	GCC	Current Tech Group
5	SW	Current SG & Board
6	GCC	Current SG & Board
7	EDC	Current technical group
8	ex RC	Former Technical Group
9	Clyde plan	Current Board rep
10	SW	Current Technical group /
11	SW	Current Board rep
12	Clyde Gateway	Current Board rep, prev SG
13	GCC	Current Board rep
14	Clyde Gateway	Current Steering Group & Board
15	Clyde Gateway	Current Technical Group
16	SEPA	Current Technical group
17	SEPA	Current Technical group
18	SG	Former / SG
19	GCC	Former / Tech Group
20	SW	Former / Tech Group/SG
21	SG	Former / Steering Group Rep
22	SEPA	Current contact

	FRM Lead
1	Edinburgh
2	Edinburgh
3	Edinburgh
4	West Lothian
5	West Lothian
6	West Lothian
7	Dundee City Council
8	Dundee City Council
9	Falkirk Council
10	Cook's Council
11	Perth & Kinross Council
12	Perth & Kinross Council
13	Moray Council
14	Highland Council
15	Argyll Council

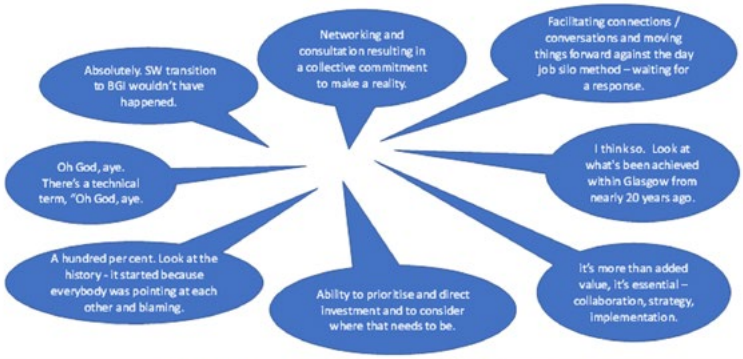
Phase 2 Interview MGSDP core partners / FRM Leads

Vision, Objectives and Guiding Principles



Phase 2 Interview MGSDP core partners

MGSDP Partner Interviews – Governance / Management *Added value from partnership approach?*



Phase 2 Interview MGSDP core partners

MGSDP Partner Interviews – Governance / Management

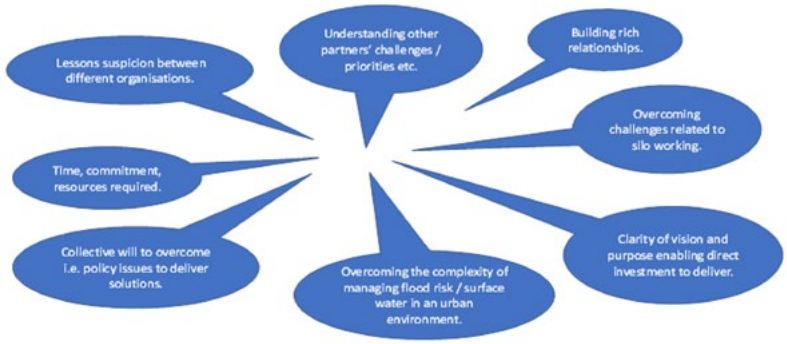
What works well? If the MGSDP didn't exist?

What worked well?		
Being action-oriented	1	1
Breadth of technical knowledge and expertise	8	8
Having good management	8	8
Learning from other projects	1	1
Long-term relationship among partners	2	2
PMO creation, management, and leadership	5	7
Preventing duplication of effort	1	1
Shared responsibility and understanding among partners	4	5
Structured and long-term plan	2	8
Valuing inputs and contributions	1	1

If the MGSDP didn't exist?		
Big projects may not have materialised	5	7
Incur higher project cost-financial and environmental	2	3
Less area-based solutions	1	1
Less investment	2	2
Projects or outcomes may have been of sub-par quality	3	3
Silo working	5	5
Wouldn't have multiple benefits or value addition from projects	3	3
No holistic response to surface water mgt	1	1

Phase 2 Interview MGSDP core partners

MGSDP Partner Interviews – Going forward - *Key lessons?*



Phase 2 Interview FRM Leads in Scottish Cities / Regions

Barriers and challenges?	R
Lack of data / records	3
Using the principles in smaller and non-urban communities	2
Big players dominating smaller players	4
Need to adapt the vision as different players and issues	2
Financing and resources - budget cuts	3
(how to) bring in other funding partners (non statutory)	
External funding deadlines vs formal approvals	
Statutory body processes to move on things	
Funding strategy alignment and LA (in)flexibility	
Party politics when it comes to funding	
Perceptions and beliefs of who's problem it is - The blame game	3
Missed opportunities for small funding pots	4
Watered down projects - low quality projects	2
Long-term maintenance (there should be awards for this!)	5

What works well?	R
Learned to include other stakeholders (since FRMA)	
We play nicer with each other	
Good working relationship with SW now	2
Sharing resources and funding	2
Bringing (non stat) stakeholders together	
Partnerships with power to influence (high level buy-in)	2
Having a shared goal	
Solving the problem as a group	
Idea sharing to come up with innovative solutions	3
Pooling different skillsets	3
Virtual exhibitions	
Creating connections	4
Working in a collaborative poitive environment	2
Learning from each other	
Having a manager to drive things forward	2

Lessons learned	R
Don't be overbearing in a partnership	2
Listen to others	3
Be open minded and share data	2
Leave the baggage behind	
The will to collaborate (right person)	3
Don't start from an adversarial position	
New people / stakeholders bring new energy	2
Don't 'glory hunt'	2
Get the young with their enthusiasm involved	3
You need a strategic thinker to help write a vision	

Phase 2 Interview FRM Leads in Scottish Cities / Regions

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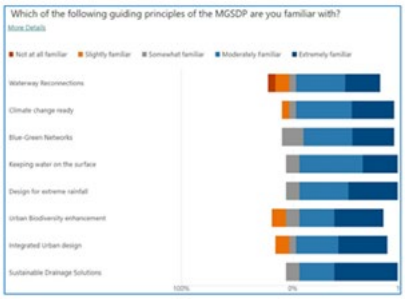
Get the young with their enthusiasm involved	3
You need a strategic thinker to help write a vision	

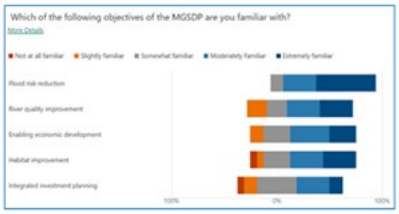
Impacts and achievements
Helped us develop drivers, learn how to collaborate and work together to move projects forwards
I think the impacts have been felt across Scotland
Their partnership approach is a road map

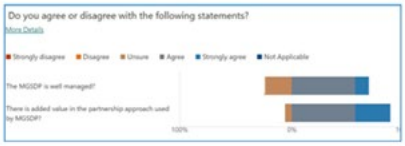
Going Forward
We'll be using some MGSDP outputs for new partnership
Get the right partner and younger generation involved
Need to adapt to new agendas as well as flooding, bring in relevant new partners

Phase 2 Online Survey

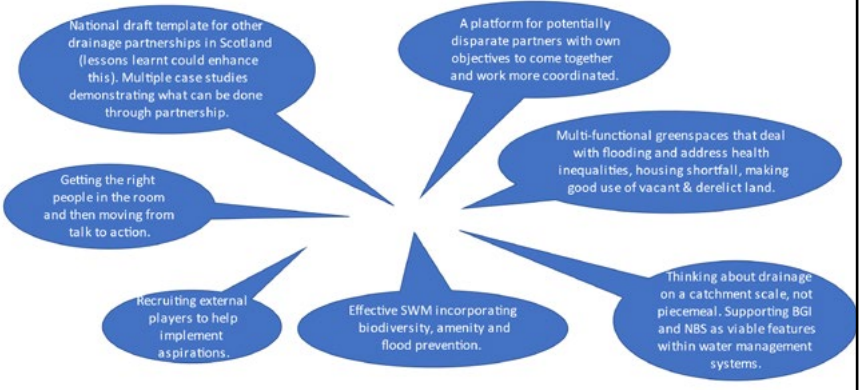
Online Survey Results 18 responses out of 31

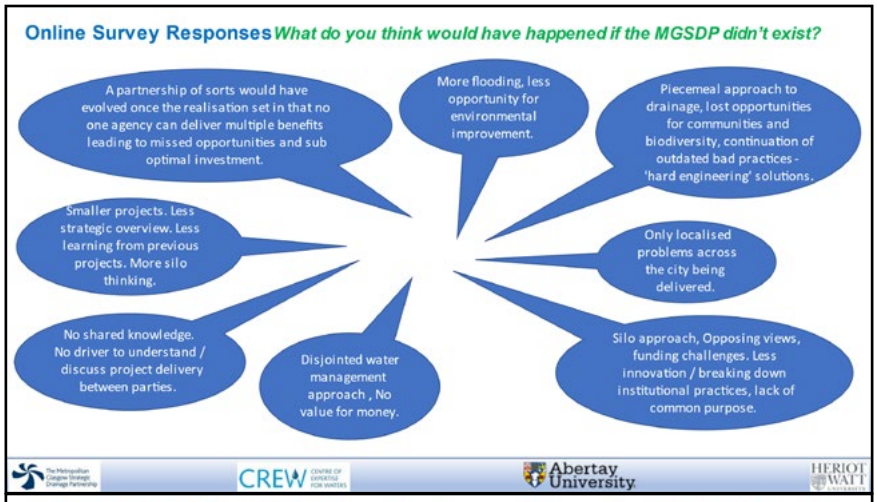


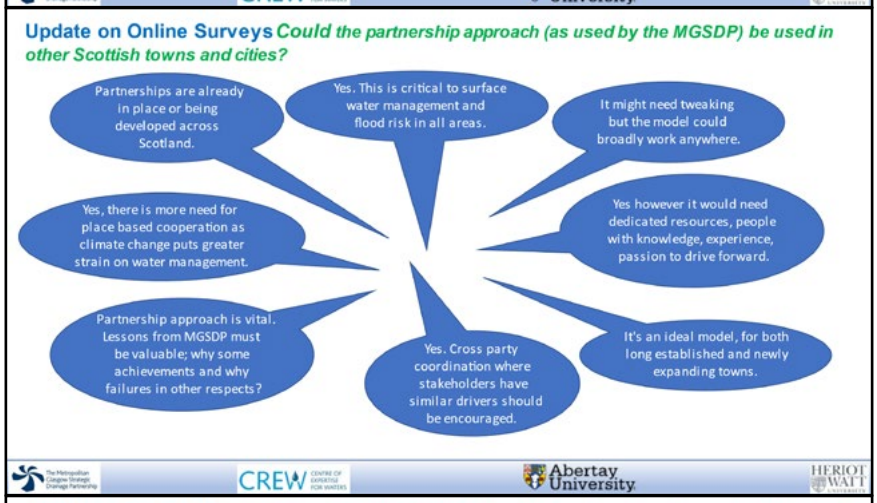


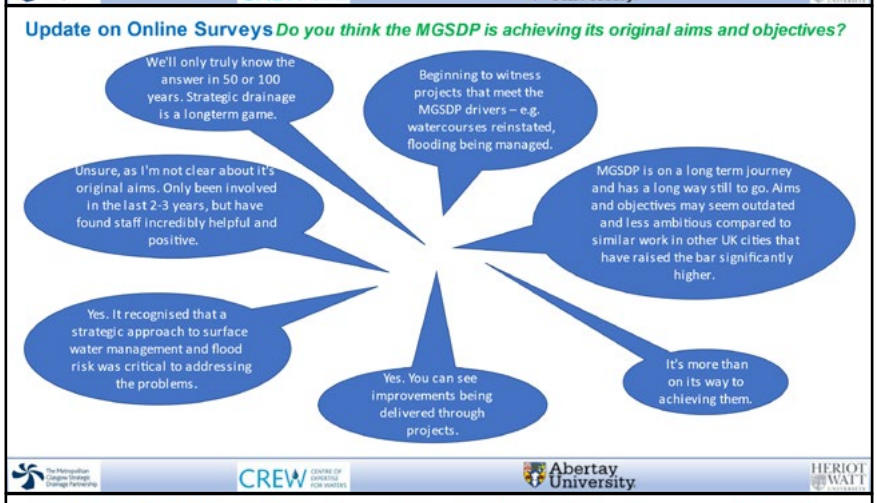


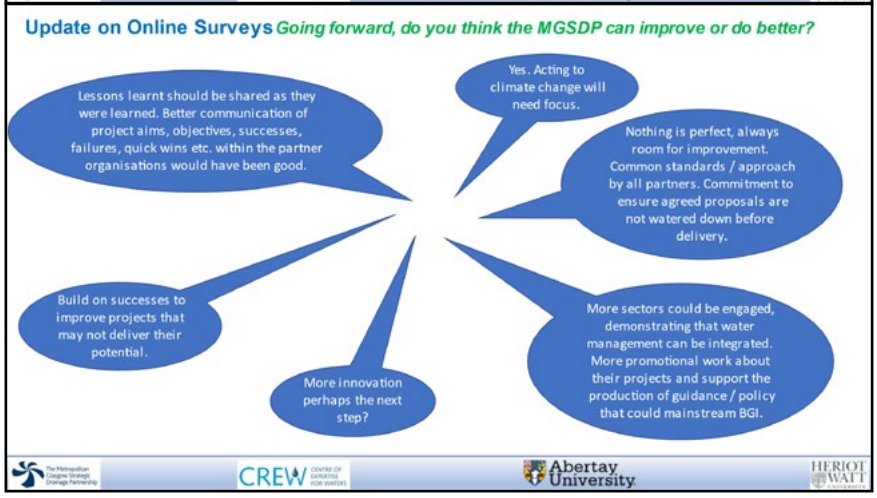
Update on Online Surveys *What would you say are the key achievements of the MGSDP?*




Online Survey Responses
What do you think would have happened if the MGSDP didn't exist?
A partnership of sorts would have evolved once the realisation set in that no one agency can deliver multiple benefits leading to missed opportunities and sub optimal investment.
More flooding, less opportunity for environmental improvement.
Piecemeal approach to drainage, lost opportunities for communities and biodiversity, continuation of outdated bad practices - 'hard engineering' solutions.
Smaller projects. Less strategic overview. Less learning from previous projects. More silo thinking.
Only localised problems across the city being delivered.
No shared knowledge. No driver to understand / discuss project delivery between parties.
Disjointed water management approach , No value for money.
Silo approach, Opposing views, funding challenges. Less innovation / breaking down institutional practices, lack of common purpose.
CREW
Abertay University
HERIOT WATT


Update on Online Surveys
Could the partnership approach (as used by the MGSDP) be used in other Scottish towns and cities?
Partnerships are already in place or being developed across Scotland.
Yes. This is critical to surface water management and flood risk in all areas.
It might need tweaking but the model could broadly work anywhere.
Yes, there is more need for place based cooperation as climate change puts greater strain on water management.
Yes however it would need dedicated resources, people with knowledge, experience, passion to drive forward.
Partnership approach is vital. Lessons from MGSDP must be valuable; why some achievements and why failures in other respects?
Yes. Cross party coordination where stakeholders have similar drivers should be encouraged.
It's an ideal model, for both long established and newly expanding towns.
CREW
Abertay University
HERIOT WATT


Update on Online Surveys
Do you think the MGSDP is achieving its original aims and objectives?
We'll only truly know the answer in 50 or 100 years. Strategic drainage is a longterm game.
Beginning to witness projects that meet the MGSDP drivers – e.g. watercourses reinstated, flooding being managed.
Unsure, as I'm not clear about it's original aims. Only been involved in the last 2-3 years, but have found staff incredibly helpful and positive.
MGSDP is on a long term journey and has a long way still to go. Aims and objectives may seem outdated and less ambitious compared to similar work in other UK cities that have raised the bar significantly higher.
Yes. It recognised that a strategic approach to surface water management and flood risk was critical to addressing the problems.
Yes. You can see improvements being delivered through projects.
It's more than on its way to achieving them.
CREW
Abertay University
HERIOT WATT


Update on Online Surveys
Going forward, do you think the MGSDP can improve or do better?
Lessons learnt should be shared as they were learned. Better communication of project aims, objectives, successes, failures, quick wins etc. within the partner organisations would have been good.
Yes. Acting to climate change will need focus.
Nothing is perfect, always room for improvement. Common standards / approach by all partners. Commitment to ensure agreed proposals are not watered down before delivery.
Build on successes to improve projects that may not deliver their potential.
More innovation perhaps the next step?
More sectors could be engaged, demonstrating that water management can be integrated. More promotional work about their projects and support the production of guidance / policy that could mainstream BGI.
CREW
Abertay University
HERIOT WATT

Preliminary Recommendations MGSDP

- Continue move towards 'adaptive governance' framework to address changing agenda's, and increase / speed up innovative practices and FRM measures (smart canal is excellent example)
- Quantifying and continuous monitoring to provide the hard evidence of impacts / benefits particularly at a local scale to ensure long -term effectiveness of implemented measures. This is what ultimately convinces wider stakeholders and communities on the ground.
- Next transition phase for MGSDP – review vision statement (to 2060) to act to wider global agenda and local environmental regeneration and economic recovery ambitions – climate ready, resilient communities, heathier spaces, placemaking, biodiversity, active travel
- Community participation - ensuring engagement / education of the wider community (not just consultation)
- Increase visibility of the partnership to FRM community that illustrate ' unsanitised ' case studies to showcase collaborative working – how to get this information to them (have great website but not everybody has time)
- Still evidence of silo practices in the partnership and exclusivity

Preliminary Recommendations FRM Community

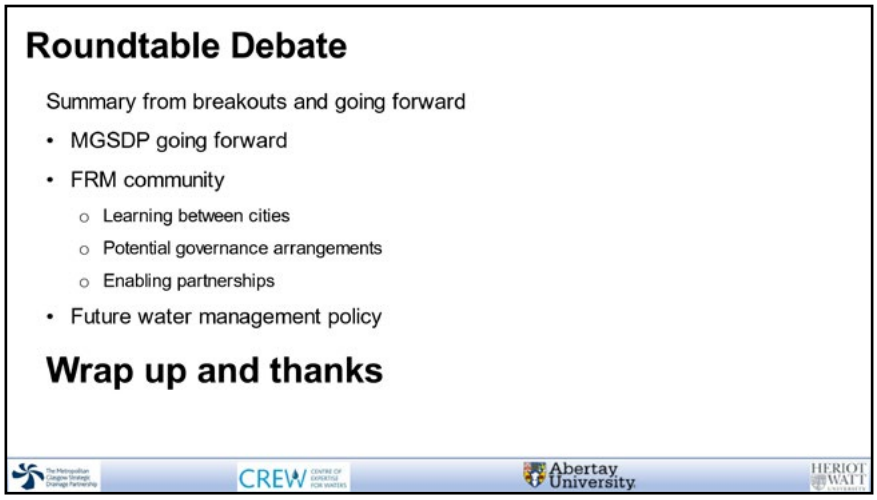
- It takes time to set up partnerships – to build trust and get the right / relevant partners with energy / enthusiasm to work together - Concerns about big players dominating the agenda
- Diversity of stakeholders / skillsets (internal and external) and including younger practitioners is important especially to incorporate placemaking, active travel, health and well -being agenda's
- Community engagement – virtual exhibitions worked very well for engaging and educating the wider community to get buy in at the beginning
- Need more evidence for overcoming funding challenges and maintenance agreements / responsibilities – to show how these were and can be achieved (case studies)
- Concerns about responsibilities and long term management…and future monitoring for impact ("*there should be awards given for this not just best concept / design / collaborations*")

Preliminary recommendations Water Management Policy

- Develop a 'how to' road map / blueprint (visioning, governance arrangements / partnerships, solution focused strategies, implementation…)
- Encouraging top level buy in from organisations to give commitments and strength to taking initiatives forward
- Coordination of internal (between departments) and external (trusts, charities, NGO's, government) funding initiatives and how to communicate / make aware what is out there to help inspire and drive upcoming agenda's (placemaking, biodiversity, active travel etc).

Interactive Session - Guiding questions

- Q1 What is your main takeaway from the findings?
- Q2 ***No one size fits all!*** In your own work can you relate to the issues (or not)?
  - Transferability of the MGSDP / other collaborative approaches to enable partnership working in your area?
  - What kind of partnerships / governance arrangements are needed to deal with local flood risk, placemaking and climate change impacts in your area?
  - What is needed to support governance arrangements?
- Q3 How can you overcome challenges?
  - What are the real context specific barriers for decision makers?
  - What capacity / skills are missing?
  - What is needed to initiate actions?
- Q4 What would be most helpful to increase understanding?
  - What do you consider most important for collaborative working?
  - What has helped you learn?


Roundtable Debate
Summary from breakouts and going forward
• MGSDP going forward
• FRM community
o Learning between cities
o Potential governance arrangements
o Enabling partnerships
• Future water management policy
Wrap up and thanks
CREW
Abertay University
HERIOT WATT

Annex 2.2 Stakeholder Consultation Supplementary Information

In this study a total of 36 'face to face' semi-structured interviews (conducted via Microsoft Teams due to Covid restrictions) were undertaken between March and June 2021. The interviewees comprised twenty-one of the MGSDP partners and fifteen flood risk management leads (FRML) in eight Local Authorities (LAs, see Abbreviations section at the beginning of this report).

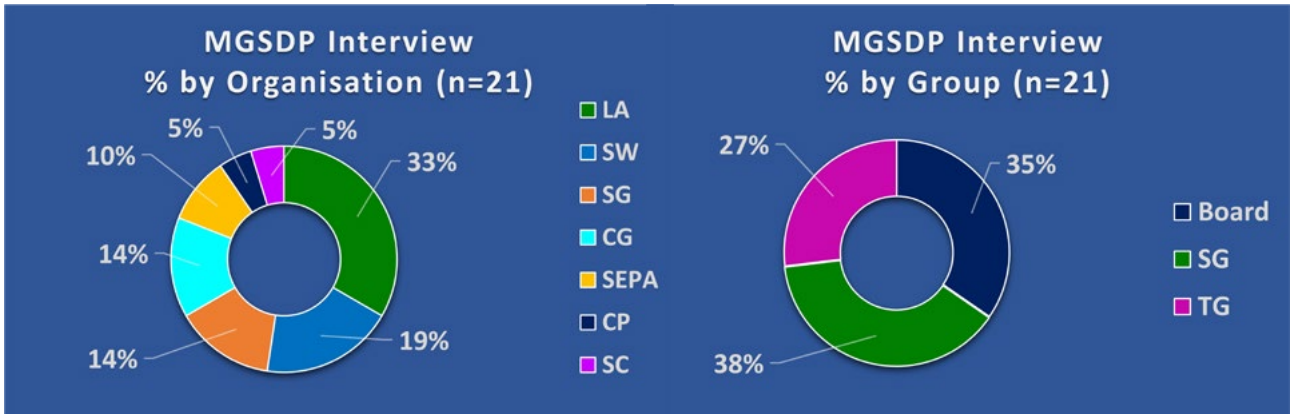


Figure 4: Breakdown of the MGSDP respondents by organisation and Board / Group representation. See list of abbreviations in the main report.

Of the 21 MGSDP partners interviewed, 33% consisted of three out of five LAs, with ~30% partners sitting on both Board and Steering Group and 5% partners sitting on both Steering and Technical Groups (Figure 4). Current (76%) and former (24%) members of the partnership were interviewed.

Of the 15 FRML interviews, three cities participated: Edinburgh, Dundee and Perth. Representatives from Aberdeen attended the workshops and completed the online survey. Other FRML represented West Lothian, Falkirk, Clackmannanshire, Angus, Moray and the Highland Councils. There was an 80:20 split between Flood Engineering and Planning backgrounds respectively. Questions were revised for some of the themes following the first few interviews undertaken with this group as although aware of the MGSDP, some were not familiar enough to comment on themes such as governance and barriers encountered. Instead, they were encouraged to provide opinions based on experiences gained from working in other partnerships. There were mixed views overall from FRML with the MGSDP perceived in different ways i.e., the MGSDP perhaps received preferential treatment from Scottish Government and at times are promoted beyond reality.

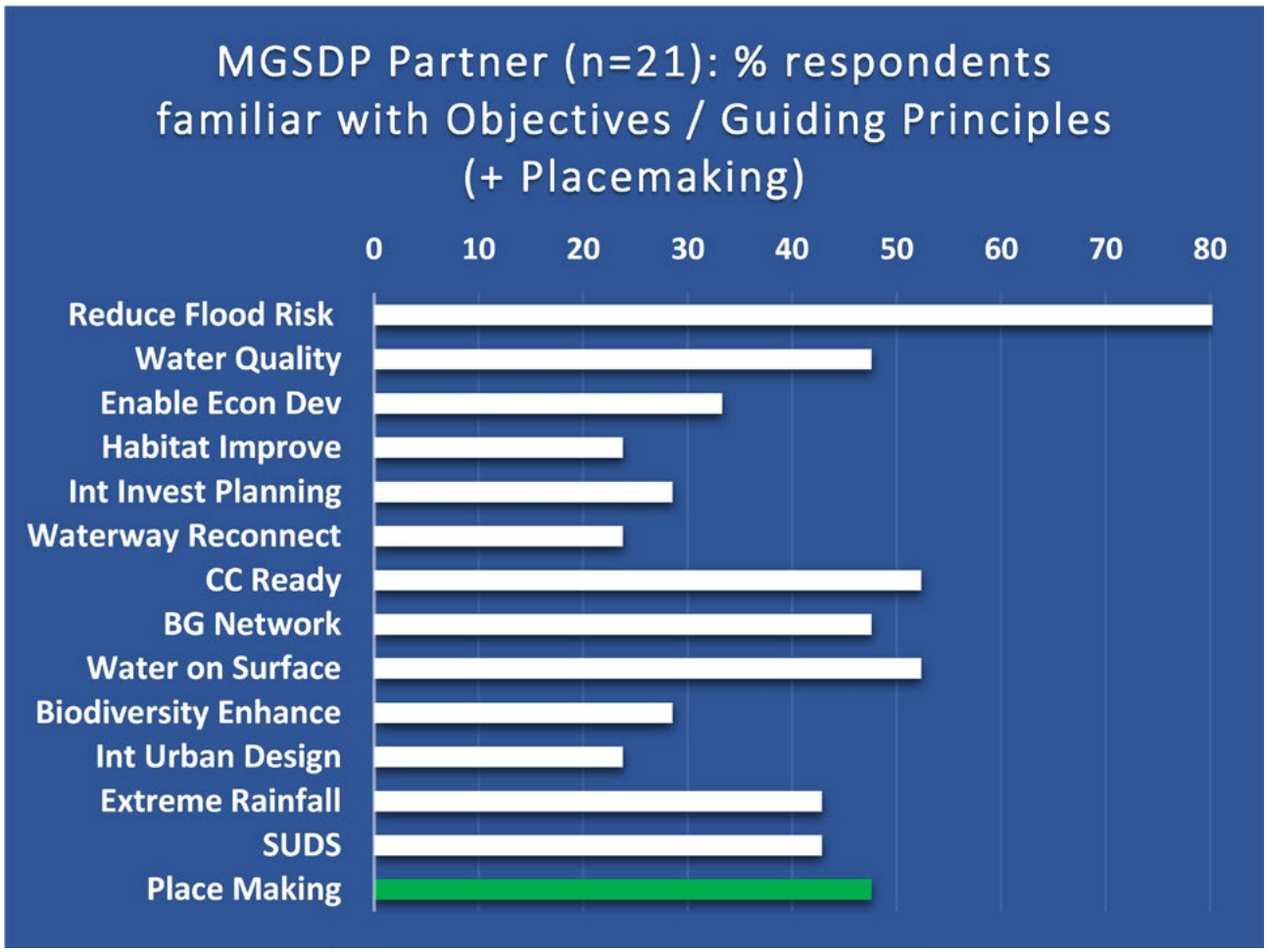
The online survey was sent to 31 FRMC with a 68% response rate. Consultants were the highest respondents (37%). 'Others' (32%) included Research Organisations, Green Action Trust, and Nature Scot. Several SW members responded (21%) and two LAs (10%).

Consultation Themes

Consultation themes were originally grouped according to good and adaptive water governance factors (success factors) and common barriers to partnership working. To gain an insight into knowledge of the MGSDP collaborative partnership strategy, respondents were firstly asked which Objectives and Guiding Principles they were mostly familiar with. Results are provided in Figure 5. Of interest and worth noting, both groups identified Place Making as either an Objective or a Guiding Principle (48% the MGSDP, 21% FRML). We consider this as testament to the integration of emergent drivers by the Partnership as it evolved and evidence of its ability to adapt to deliver good water governance drivers.

Survey respondents from the FRMC were also questioned regarding MGSDP Objectives and Guiding Principles using a Likert scale. The least recognised Guiding Principle was 'integrated urban design' (67%) and 'integrated investment planning' being the least recognised Objective (39%).

The following information provides an initial analysis of results based on consultation structured and emerging themes supported by direct quotes from interview or survey respondents from the MGSDP Partners, FRML and FRMC. A high-level analysis based on the OECD key drivers for water governance (effectiveness, efficiency and trust & engagement) was then applied to these initial results and can be found in the short report.



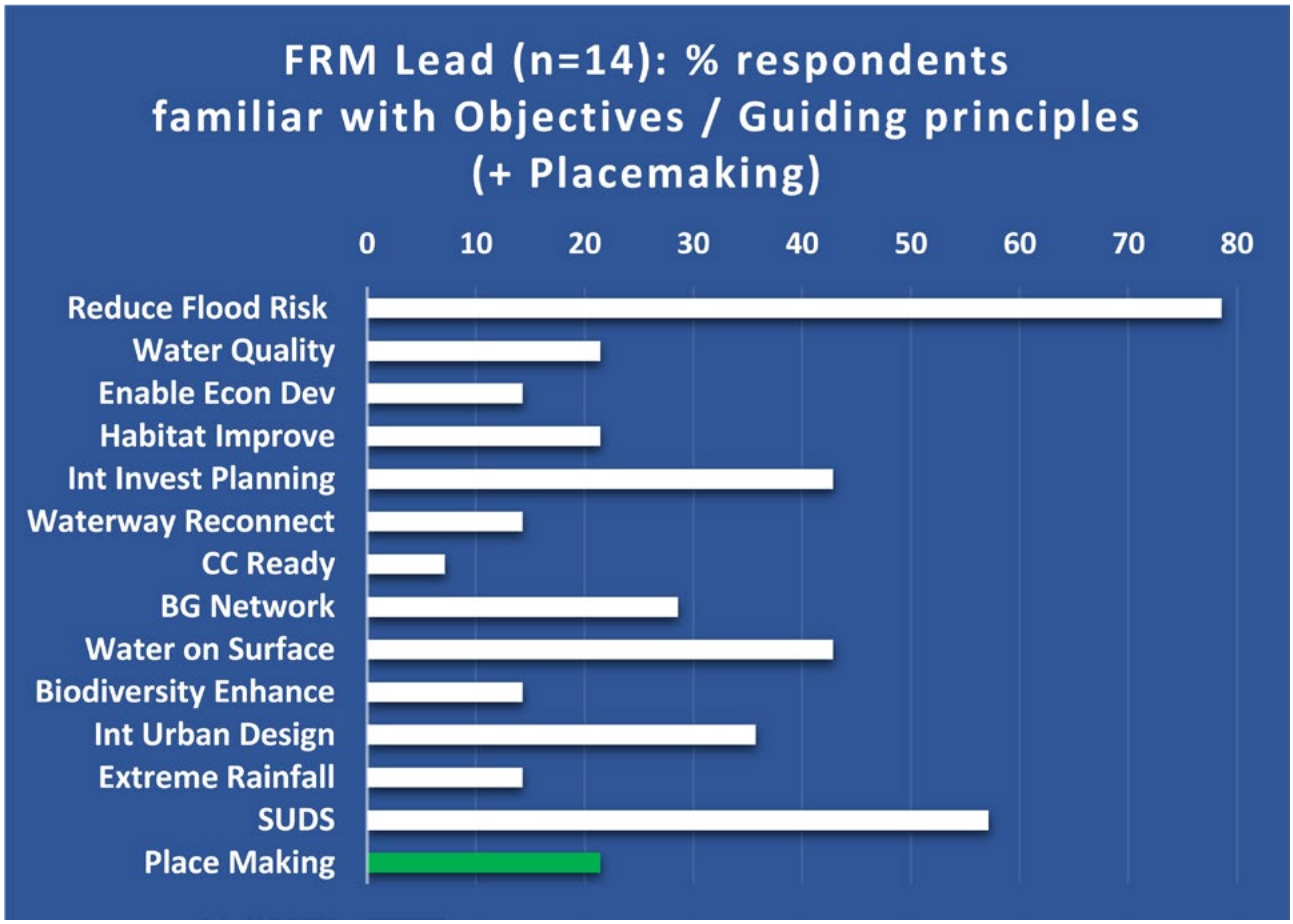


Figure 5: Familiarity with THE MGSDP Objectives and Guiding Principles – the MGSDP and FRM Leads

The MGSDP governance arrangement and partnership management

Interviews helped define the current governance structure including management, leadership and efficiency of the partnership. There are three groups that meet regularly (Board, Steering Group and Technical Group) with key functions to drive the MGSDP Vision forward via collaboration, negotiation, and implementation. There is a strong structural element – the Project Management Office (PMO) holds the partnership together. The PMO is a formal role that is currently funded by partners who have representation on the Board. If the PMO role did not exist, *"the Partners would be consumed by their day jobs"*. All other Partners are represented on either one or both Steering and Technical Groups (SG and TG). The PMO primary function is facilitation, collaboration, making connections, problem solving and administration to deliver the drainage masterplan.

The current governance framework is based on interviews with the MGSDP stakeholders. Glasgow City Council is the only LA with representation on the Board, its representative chairs SG, sits on TG and acts as an intermediary between TG and Board. Out of six neighbouring LAs, two are not represented - West Dunbartonshire and East Renfrewshire. A challenge for the Partnership is replacement of members who move on to other posts or retire. This is noted on the risk register as members may not be replaced due to time / resource issue to justify the added value, particularly LAs (*"non-statutory work is dropped"*) or replacements may not have the *"knowledge, engagement or enthusiasm"* for the role. An emerging sub-theme found from the MGSDP responses were concerns related to equity within the partnership i.e., some partners thought the partnership was city centric.

Core engagement is via meetings and the sharing of data and information related to ongoing projects and capacity building. The Board meets quarterly *"to provide strategic planning oversight"*, SG and TG meet every six weeks. The SG make recommendations and the Board make the ultimate decisions. The Board mainly get involved in other aspects if issues cannot be resolved at SG / TG level. Currently there is an additional 'Canals Group' that meets regularly, and regular meetings with local groups related to the River Clyde (i.e., Clyde and Loch Lomond Local Plan District (CaLL LPD) and Clyde Mission).

There has been direct interaction between Board and SG since inception, but there is still no direct interaction between Board and TG. Not all Partners attend all meetings if the agenda is not relevant, or resources are unavailable due to budget pressures. Moving to online format during the Covid pandemic reduced this issue somewhat. Regardless of attendance, all Partners receive relevant paperwork to keep them in the loop with ongoing developments so they can engage if required. A second emerging sub-theme from some MGSDP responses was that more communication and transparency was required between the groups regarding strategic goals linked to technical objectives and delivery of projects.

Beyond formality of a dedicated PMO, collaboration agreements between Partner organisations and Terms of Reference for each group, governance is informal. There was a small number of partners that felt there was a need for clearer definitions of SG and TG roles. Project funding is formalised directly by involved partners with a clear set of guidelines for co-funded projects. When problems are identified the *"Partnership works collectively to find a solution"*. The MGSDP does not directly influence what projects go forward or where to direct investment. Partners discuss projects and prioritise collectively based on solution multiple benefits, multi-functionality, and linking into other local group aspirations or strategies i.e., CaLL LPD etc. Generally, SG decide direction of travel which is signed off by the Board. There is a good mix of professional capabilities at all levels with discussions to collectively develop and progress projects.

Statutory and investment drivers for SW in Glasgow Metropolitan are to *"ensure regulatory water quality and flooding issues are not a barrier to growth"*. Alongside achieving 2030 climate emergency targets, the leading driver for GCC *"is to reduce flooding with economic development the key objective then integrated investment and water quality"*. Other partners and neighbouring LA key drivers include responding to the climate emergency by *"keeping water above ground using BGI"* to minimise impact of extreme weather events with CG adding that integrated infrastructure and planning are also a priority.

Land use and SWM policies are becoming aligned across the Metropolitan LAs. Aligning funding (*"the Holy Grail"*) between heavily regulated institutions is not easy but *"can be achieved with the backing of high-level Partners"*. It is hoped that fiscal arrangements will be easier with Scottish Government new direction and recent policy on water resilient places. There are also other funding sources i.e., City Deal funding for regeneration projects has helped considerably for delivery of projects. There is no clear framework for SUDS long term management with a *"preference for SW vesting below ground and LA above ground"* and the ability to have these discussions via the MGSDP platform often results in waivers if a scheme does not meet SfS4 standards. There is no formal mechanism to ensure solutions are fit for purpose i.e., monitor functionality or multiple benefits for the community, evidence is mainly anecdotal.

To gauge practitioner opinion on the MGSDP governance and management, closed questions using a Likert scale were used for the online survey. Overall ~70% agreed that the MGSDP is well managed.

Added value of the partnership approach

A further question related to the success factors for collaborative partnerships asked respondents to consider what the 'added value' was for a partnership approach. The MGSDP partner responses were primarily related to the effectiveness of the partnership to deliver solutions: facilitating connections, "*communication*" (71%), networking, "*sharing knowledge*" (48%) at all levels aided by "*joint investment*" practices (52%) to "*deliver integrated*", cross sectoral and cross-boundary multi-functional solutions that provided multiple benefits and "*more value for money*" (67%). Influencing national and local policy and replication of the collaborative approach are key achievements of the partnership and were also considered added value (24%).

The FRML respondents were also asked this question in relation to collaborations in general. They cited that having some form of "*leadership for direction and coordinating disparate organisations*" was considered added value (43%), as was collaborations that included different skills and senior decision makers (36%), pooling resources and funding to deliver multiple benefits (30%) and sharing information to solve issues and implement projects (30%). Using a Likert Scale, the FRMC agreed (85%) that there is added value from the (MGSDP) partnership approach.

Barriers and challenges to the partnership approach

This section was designed to elicit opinions from all groups regarding common barriers and challenges to partnership arrangements. There were clear links between MGSDP experiences and opinions for partnership working in general experienced by the FRML and the FRMC. The MGSDP partner responses revealed that the main barrier to successful partnering was ensuring that the right people with "*commitment and the confidence to speak out*" were involved at all levels to drive common agendas forward (57%). Fragmented statutory duties and BGI management were considered barriers; "*national FRMPs don't have the same timeline as sewer replacement plans, so you always have a fragmented approach*" and "the *adoption process has never gone away*" (52%). Funding alignment and legal arrangements take time (43%) but that was no excuse to give up as issues can be overcome: - "*we'll always speak about not working in silos, but when funding comes down to it, it is in silos*"; "*funding packages don't align from the government, and I don't think the government has quite got its head round how to resolve that*". The lack of corporate and collective risk appetite was also considered a barrier to innovation (10%); "*some are more risk averse than others*"; "*learning by doing, doing by learning, some MGSDP partners are maybe wary of doing this*".

The MGSDP respondents were also asked what mistakes have been made. These were cited as: missed opportunities by "*being too slow*" at the beginning of the partnership, mainly attributed to "*not having the right people singing from the same song sheet*" or being too risk averse; opportunities to connect with other projects and share external funding pots mainly attributed to lack of early communication; underestimating how difficult it is to retrofit BGI; and "*commissioning work that was left on the shelf*".

The FRML responses were in line with the MGSDP - aligning budgets and or funding cycles between statutory bodies was unanimously considered the most difficult barrier to overcome for creating similar partnerships as this did "*not allow flexibility* nor *lend itself to a strategic, long-term approach*". Approvals and sign off for delivery of schemes to "*justify the spend*" in public sector bodies was also a big barrier to partnership working (57%); "*the process is too slow going through committees to meet deadlines*" particularly projects with external partners. Lack of resources, mainly time related was a barrier as several respondents considered that they were the "*weakest link*" in any partnership (50%). Other barriers include maintenance burdens (43%) and pressures from local councillors; "*we have to justify it to our councillors*" and managing public expectations including social media posts (36%).

The FRMC respondents were asked what they thought the key limitations of the MGSDP were with a view to elicit what was perceived as barriers and challenges for the Partnership. The main trend related to budgets, resources and funding cycles (67%) closely linked to silo working (~33%): "*despite nearly two decades of successful partnership working and much common ground made, the public bodies are still working in silos following corporate objectives with own funding and timescales*". Bringing new partners and experience to the partnership (17%) and ensuring public understanding of the benefits delivered to gain citizen buy-in was considered a missed opportunity (~17%) were also noted limitations.

The MGSDP key achievements and success factors for collaborative partnership working

This theme encouraged respondents to think about success factors for the MGSDP collaborative approach and for partnership working in general. Direct questions included: what are the key achievements of the MGSDP? and if their own organisation had been influenced in any way by the partnership including a shift in culture (behaviour changes). Community participation is considered an attribute of good water governance systems and as a key dimension related to trust and engagement, and this was also considered by respondents. There were connections with MGSDP key achievement responses and 'added value' of the partnership, such as co-developing a vision and strategy (48%). Changing mindsets to push a BGI

agenda (38%) making Glasgow a better place by *"softening up the urban environment"* (24%); securing investment (33%) to significantly reduce flooding and improve water quality (29%) were also key achievements. Glasgow's smart canal (33%) was considered a game changing capacity attained by the partnership and considered as proof of the MGSDPs ability to adapt governance arrangements to meet future challenges.

Installation of SUDS on a large scale was considered the key achievement for the MGSDP by the FRML respondents (36%). The FRMC respondents referred to project delivery as a key achievement: *"Getting the right people in the room and moving from talk to action"* (60%). Other more elaborate responses from FRMC were linked to multi-benefits of solutions (27%): *"Creating multi-functional greenspaces that deal with flooding"*. Providing a platform for coordination (53%) of diverse skills (27%) to achieve aspirations and future proofing through FRM (27%) were also common themes.

Influencing other organisations and culture shifts

Respondents were asked if the MGSDP partnership approach had influenced practices and or decision making to deliver solutions in their own organisations. Several MGSDP respondents advised that driving blue green networks, the *placemaking agenda* and the philosophy of enabling economic development had been adopted by their individual organisations. The FRML responses revealed that 50% had *"piggy-backed the MGSDP governance structure"* to set up their own drainage partnerships. Others reported that schemes such as smart canal and city raingardens (43%) provided inspiration to take elements of these strategies forward in their areas.

The FRMC respondents were asked if the partnership approach as used by the MGSDP could be replicated elsewhere. In total 61% of FRMC respondents agreed the approach could be replicated: **"***Given that this is the decade for action to tackle climate change, anything less than the partnership approach of the MGSDP will simply fall short"*. Some people, however, offered only qualified support: *"Probably but is this because regulators, SW and LAs cannot work together well enough normally*?" The FRMC were also asked if the MGSDP had helped their organisation deliver any objectives with 42% agreeing that this was the case for their organisation, specifically: *"helps us support urban biodiversity and create opportunities for people to enjoy nature"*.

Community engagement and participation

There were limited responses from the MGSDP respondents (38%) regarding community engagement as not all partners are involved in activities or knowledge was anecdotal. Whilst there were some positive steps forward overcoming challenges, it is still a challenge to undertake truly active public participation in decision making processes - a key attribute of good governance systems. Good examples were provided by partners from Clyde Gateway URC; *"whether it's required through a planning process or not we always exceed what's required. All our masterplans have in depth community consultation events – we work with kids and the youth centre. For individual projects we do project specific consultations, and we usually have a stalwart of community activists who are keen to get involved"*. Successful community participation in other Metropolitan areas have mainly been in collaboration with SW, SEPA, *"housing associations and flood advisors who get to know their communities"*.

There was a 57% response rate from FRML, primarily from smaller LAs in rural areas affected by flooding who have built up relationships with their communities through FRM planning processes. Knowing what information to share and being aware of *"who's prepared to listen and who's not"* are important factors. An example is provided by one respondent: *"The community have seen a tangible gain. It's not just a Pond, the fact it delivered park improvements that benefit the local community, alongside attenuating water, and the fact that the community were involved - that's where the most successes are to be gained. By design or accident, it raises people's awareness around water management by being involved in that design and, therefore, more social media coverage and discussion around managing water"*.

Going Forward

For new partnerships going forward, the FRML realise that although MGSDP governance model for collaborations can be replicated, drivers and aspirations will be different for new drainage related partnerships (43%) and that these partnerships will need good leadership and partner commitment (30%). It was agreed that the biggest drivers for new partnerships were implementing FRM Act via flood protection schemes and removing surface water by implementing SuDS (50%). This would mean developing a common aim that integrated with other agendas relevant to each city / area such as placemaking, active travel, climate / biodiversity crisis, and improving the water environment (21%).

The FRMC were asked if the MGSDP had achieved its original aims and objectives. Respondents generally thought that *"strategic drainage is a long-term game"* (64%) and that the MGSDP is *a work in progress* (36%). There were some 'yes, buts…' (14%): *"aims and objectives seem less ambitious compared to similar work in other UK cities (London, Manchester) that have raised the bar significantly higher"*.

Key lessons learned to date

Several MGSDP Partners reflected on lessons learned to date. Patience and the willingness to accept that it can take time to build up trust and develop the equity and inclusiveness attribute was considered the key lesson learned; *"there was much discussion before we became comfortable stepping out of our silos and before projects came to fruition";* agreeing a common aim to develop the long-term strategy (57%) and having a PMO to drive that process and sustain *"strong groups"* (24%). Linking to success factors was that knowledge building (10%) meant that they were not a *"narrow-focussed partnership"*.

Key lessons learned from the FRML responses based on experiences with other partnerships is to ensure early engagement in the process and maintaining focus on the agenda (43%) with invested and committed partners (*champions*) including high level decision makers and *"the younger generation with their enthusiasm"* (57%). Being open, honest and sharing information helps build trust (29%) to organise and drive a successful partnership and helps overcome barriers such as equity within a partnership and funding cycles that are not aligned (29%).

What would have happened if the MGSDP did not exist?

In response to 'if the MGSDP didn't exist', MGSDP partners advised that they would still be working in silo's (43%) with less joined up strategies at catchment level – *"a piecemeal approach to FRM"* (24%). Projects would cost more and take longer to deliver and have limited multiple benefits (24%). There would be missed opportunities such as the smart canal and Clyde Gateway (19%) and uncontrolled flooding would still be prevalent in the Metropolitan area (14%).

The FRMC responses resonate with those of the MGSDP - there would be less BGI and associated multi-benefits (57%) with missed opportunities and smaller projects (43%) that would take longer to deliver (29%). There would be no shared goals or coordination of efforts (50%) with continued silo working (29%) including less investment in solutions (21%).

Suggested improvements for the MGSDP

Several members of the MGSDP have concerns going forward related to refreshing the 2060 vision and the next strategic phase (67%). Some Partners referred to the vision as a technical, dry document circulated as a paper for comment. The next phase will be more difficult, and the new strategy will influence acceleration of the programme of works and integration of projects; *"what will we say we've achieved over the last 10 years that's different to what we've done previously if we repeat this review?"*

Other opinions related to: *"dynamism / enthusiasm"* during meetings and interactions between groups as this is key to providing *"flexibility for idea input from all Partners"* (38%); expanding membership (33%) whether *"more LAs or Clyde Mission or House Building Federation representation around the table"*; aligning with other objectives such as the climate / health agenda's whilst remaining focused on drainage (33%); visibility, communicating outputs and engaging with the public better (19%) – *"the public haven't heard of the MGSDP"*; and finding resources to monitor and prove benefits – *"a perennial problem"* (10%).

Going forward, 79% of FRML would like more communication from the MGSDP about the *"localised impacts of solutions delivered demonstrating actual costs and multi-benefits realised"* to help *"foster and fast track partnership working"* in other areas of Scotland.

The FRMC thought that the main area where the MGSDP could improve the most was self-promotion and sharing lessons learned (40%). The MGSDP website provides information on the Partnership, strategy and projects including regular newsletters indicating that some respondents are unaware this information is available. Partnering with other organisations was also an area for improvement (27%); *"engage more sectors to foster novel innovations"* and more focus on the climate agenda (20%). A stronger public communication campaign was recommended (20%): *"wider community engagement to deliver economic and quality of life benefits"*.

Stakeholder Workshop

There were seventeen attendees across two workshops: LA (47%) – Aberdeen City Council, Dundee City Council, Glasgow City Council, East Dunbartonshire Council and Moray Council; 'Others' in attendance (24%) included Nature Scot, Transport Scotland and Scottish Government; There was 18% from the research Community. Overall, 33% were the MGSDP Partners.

Lessons learnt from Findings

Combined workshop responses related to the lessons learnt from the research findings are split into those for the MGSDP and those for drainage related partnerships in general. For the MGSDP, it was interesting to be reminded of the evolution of

the partnership against the backdrop of policy such as FRM Act and resilient placemaking, how the Partnership was ahead of the game and now that the rest of FRMC has caught up how to adapt and build in the ethos and principles. The main takeaway was that addressing issues surrounding FRM and SWM is a long journey (41%) and that a co-developed vison and strategic plan gives the partnership focus (35%). This was linked to building trust and breaking down organisational barriers (18%) *"Trust, establishing relationships where you can speak honestly and openly"*; including sharing knowledge and ideas (12%) to experiment (learning by doing) and get solutions in the ground (12%): *"having a common vision and aims drive collaborations and deliver better projects"*. Establishing a coordination role was considered vital for a partnership (35%) as it provides form and structure to *"pull the partnership together and make it function"* as was sharing budgets to deliver multiple benefits (29%), this included within the partnership and external sources with new partners.

The main lessons learnt from FRML interviews for other collaborative drainage related partnerships was the resource challenge, short and long-term, from upskilling staff to maintenance burdens (47%) to supporting a partnership (29%) *"funding people (time is precious)*; *responding to whose fault flooding is takes up resources as it often is not clear where the water came from"*; *"Many LA's are working in silos with skills gaps especially for maintenance and costing of SUDS"*.

Behaviours around risk taking related to a blame culture (29%) and fragmented responsibilities (18%) that also cause confusion for the public are still prevalent and barriers to overcome. From a governance perspective: stakeholder mapping (34%) to get the right people with commitment and other groups that can add value and contribute to new challenges is required; Securing high level buy in (18%) and networking opportunities (12%) were also needed to support the process.

There was debate about the importance of resilient places (29%) and associated layers (green space, active travel etc.) but it was agreed that the key objective for drainage partnerships was reducing flood risk to *"maximise all benefits that BGI deliver for the natural environment and achieve good placemaking whilst keeping FRM / SWM as a priority"*. Public expectations and climate resilience was also a theme; *"everybody's thinking about the environment"* and *"multi-functional green space"* including equity of schemes (12%) – *"nobody should be left behind - BGI are not just for the affluent"*.

No one size fits all

During the interactive session attendees were asked what partnership arrangements would be needed in their own locale with a consensus that the MGSDP ethos was replicable and agreement that other cities / areas had different needs and drivers that would pull partnerships together (29%). Examples were provided: Edinburgh's water vision to manage surface water related to more frequent extreme events and Dundee working on surface water solutions for brownfield redevelopment.

There was support for trying to speed up implementation of innovative solutions that align with other agendas and attract co-funding (24%); *"we don't have time to worry about failure anymore"*. Increased visibility was also a priority (24%); *"sharing good practice and information for others to access"* internally to increase awareness and uptake and assist with behaviour change and externally to *"inspire other partnerships and encourage collaborations for joined-up opportunities"*.

There was considerable debate about 'watered down solutions" from planning to implementation and planning committees that allow domestic extensions in floodplains (24%). Many challenges still exist with silo working (18%). Issues related to long-term management of BGI (12%) are still prevalent as this is the bottom line for decision makers and ultimately implementation of the measures.

Finally, there was a recommendation that a 'how to' road map or blueprint is developed that signposts success factors for collaborative partnerships based on lessons learnt from this review particularly for smaller LAs that are behind the curve and just embarking on a drainage related partnership journey.

Important factors for Collaborative Working

The key factor in favour of collaborative partnerships was shared resources – expertise, knowledge, and funding (59%) to deliver a shared vision with leadership, coordination (48%) and high-level support (18%). Communication was considered crucial to *"talk about challenges"* (41%) and develop trust to help *"move away from the blame culture"* (29%).

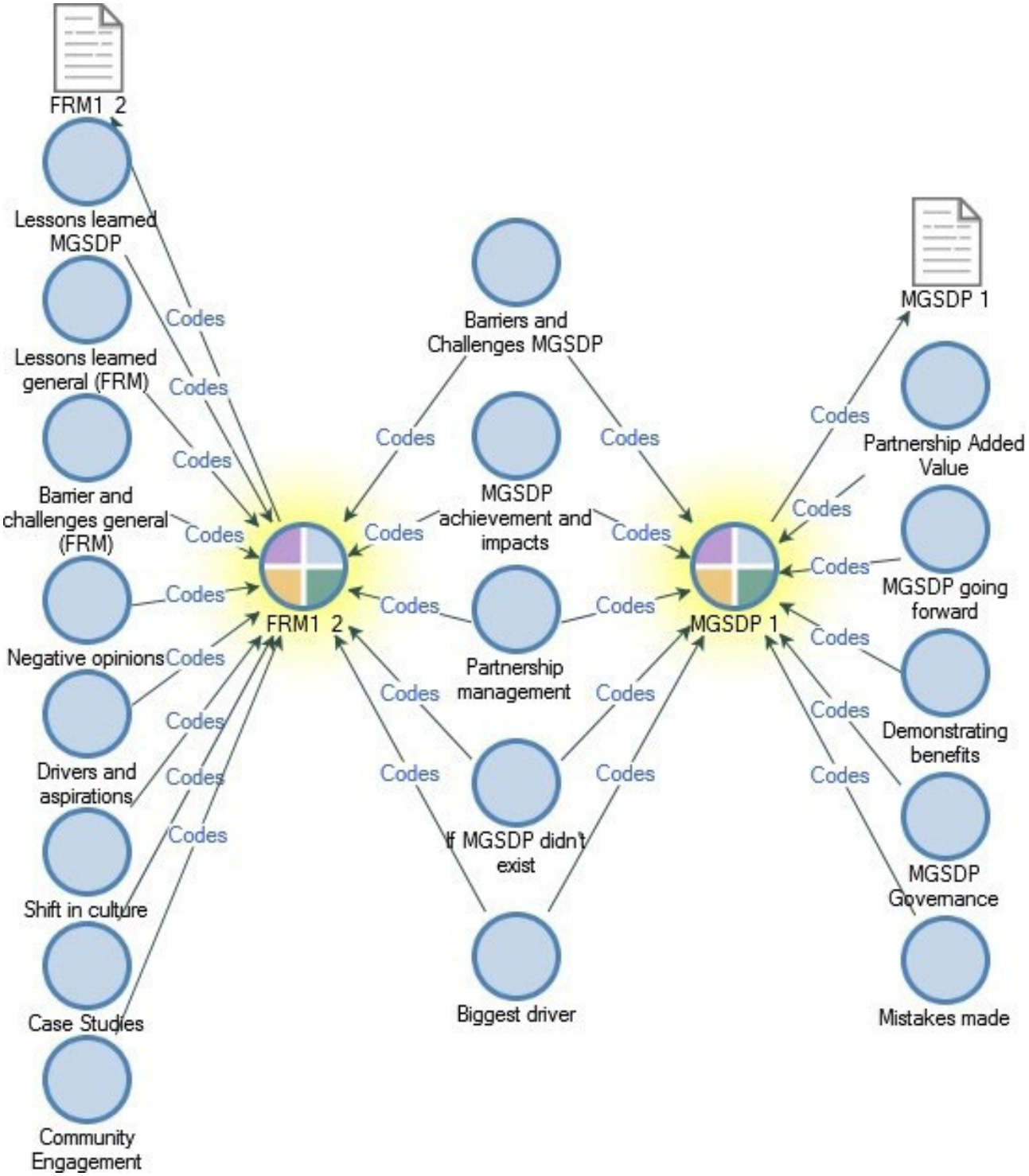
Discussions around the lack of awareness *"by elected officials who push in different directions because they don't understand the issues and solutions available"* ended with agreement that we need to educate / raise issues related to benefits of GBI versus pipes in the ground so they could *"become champions and do the right thing for Scotland"*. There were also discussions around rewarding participation in partnerships; *"organisations don't value bringing together partnerships - it is not easy and often not supported"* and creating a unique identity for a group *"that is neutral from the individual organisations that make up a partnership"*.

Annex 2.3 Stakeholder Consultation Data Analysis and Output Graphics

Table showing main themes, number of respondents (files) and number of respondent references

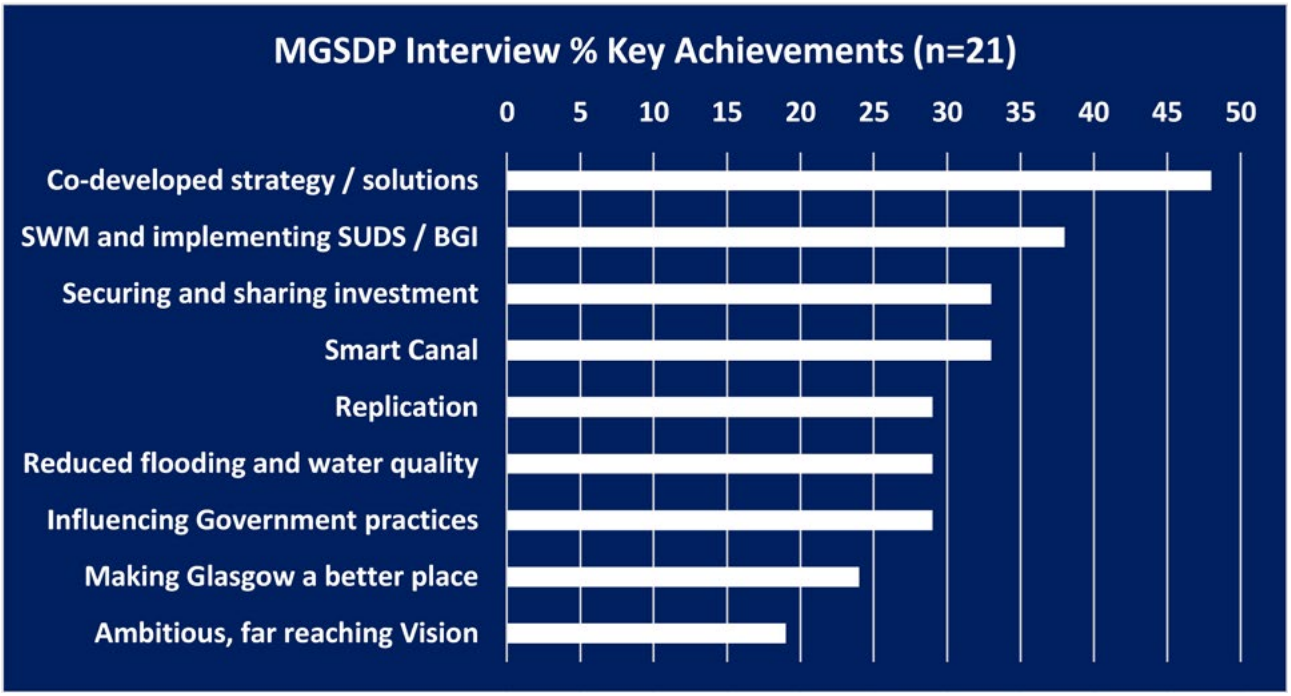
Codes	Files	References
New Partnerships going forward	25	170
Barriers and challenges FRMC	21	137
The MGSDP achievement and impacts – success factors	42	129
Barriers and Challenges the MGSDP	34	124
Lessons learned (FRMC)	14	76
Case Studies	27	75
The MGSDP Partnership Added Value	26	62
The MGSDP going forward	27	62
The MGSDP Governance approach	24	62
Lessons learned the MGSDP	20	50
Partnership management	19	39
Negative opinions	6	37
What worked well FRMC	11	26
FRMC partnership added value	8	14
Sub-Codes	**Files**	**References**
If the MGSDP didn't exist	35	49
Shift in culture	25	46
Drivers and aspirations – new partnerships	14	32
Influenced by the MGSDP	19	31
Community engagement	15	24
Mistakes made	13	22
Demonstrating benefits	7	17

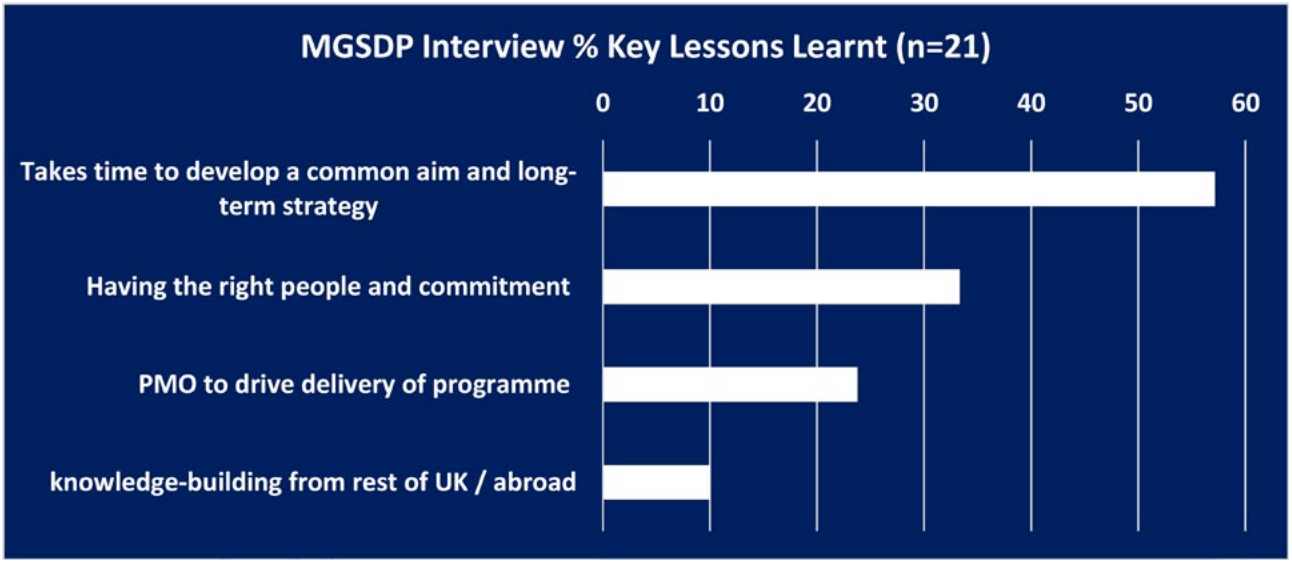
Example of comparison codes for MGSDP and FRML interviews



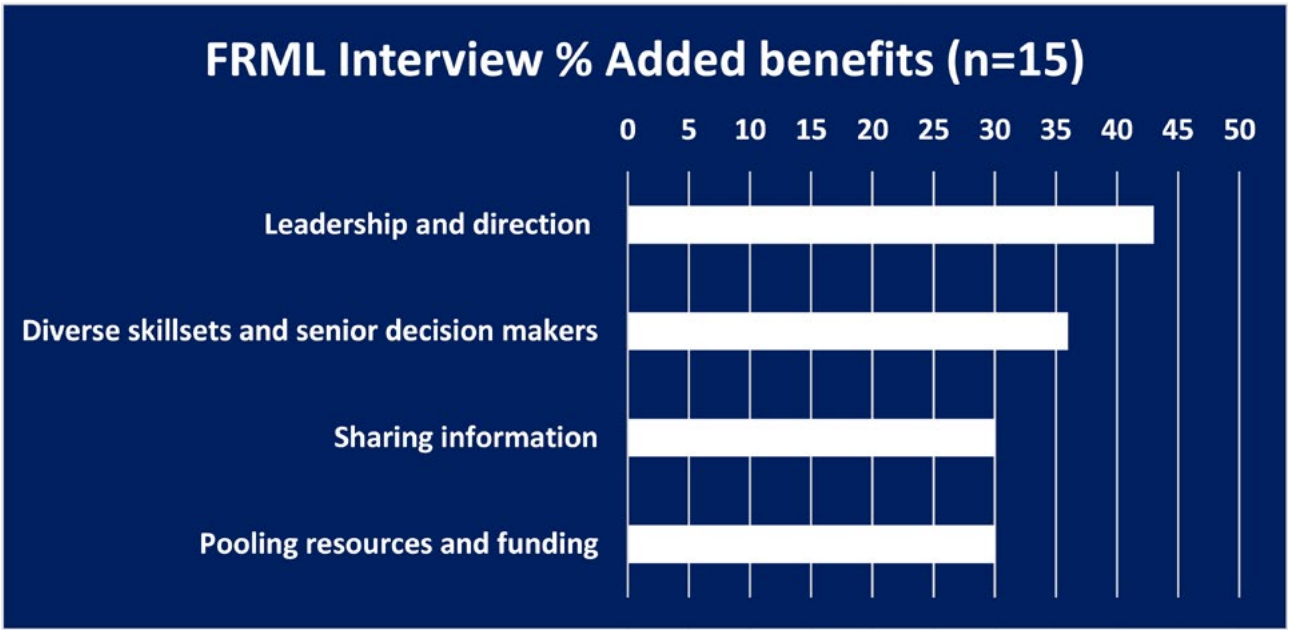

MGSDP Interview % Added value of the Partnership (n=21)
0
10
20
30
40
50
60
70
80
Communication between partners
Delivering projects in partnership
Joint funding / investment
Sharing knowledge / experience
Influencing policy / other partnerships
Place making agenda

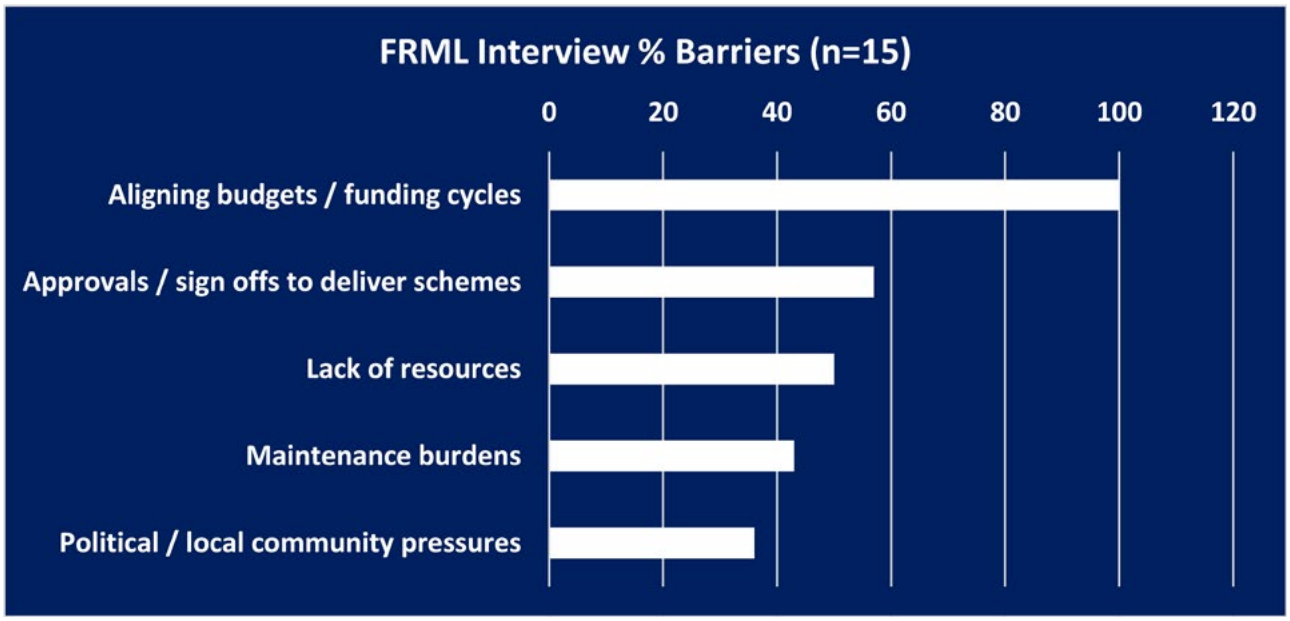

MGSDP Interview % Barriers (n=21)
0
10
20
30
40
50
60
The right people with commitment and authority
Fragmented statutory duties / maintenance responsibilities
Funding alignment / legal arrangements to deliver projects
Larger players dominate - Glasgow centric
Corporate risk appetite
MGSDP renewed vision
Self promotion
Volume of paperwork





FRML Interview Analysis Results

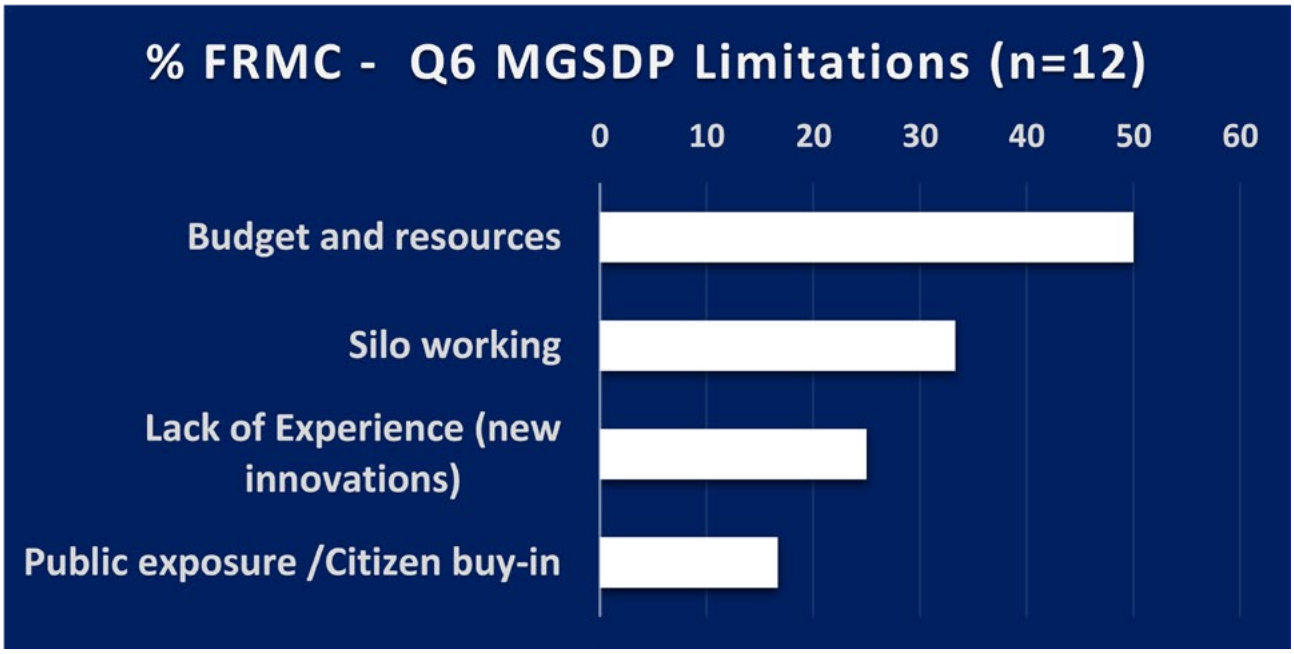



FRML Interview % Barriers (n=15)
0
20
40
60
80
100
120
Aligning budgets / funding cycles
Approvals / sign offs to deliver schemes
Lack of resources
Maintenance burdens
Political / local community pressures

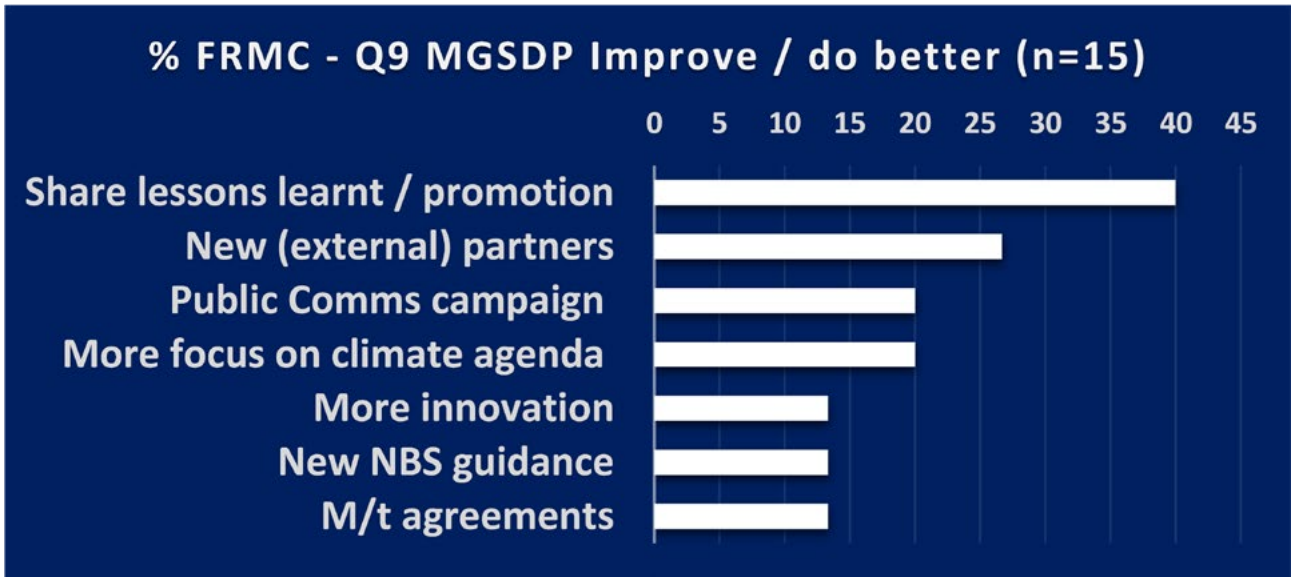

FRML Interview % New Partnerships (n=15)
0
10
20
30
40
50
60
Key driver FRM - removing surface water
Local drivers and aspirations needed
Good leadership and commitment
Common aim integrated with emerging agendas

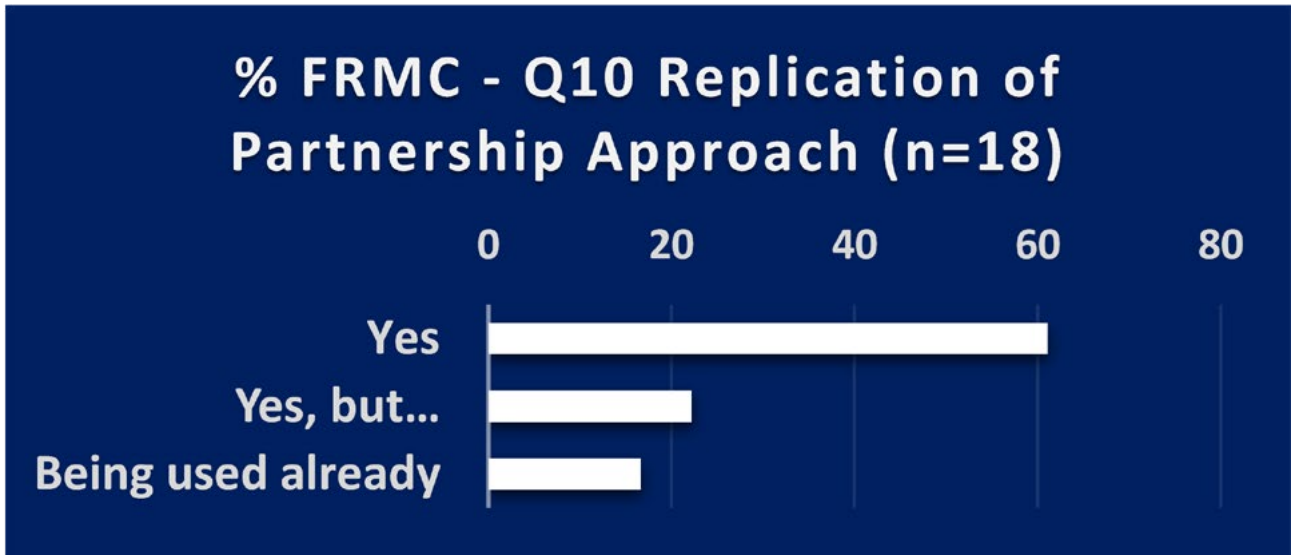

FRML Interview % Lessons Learnt (n=15)
0
10
20
30
40
50
60
Need committed champions
Early engagement for agenda building
Being open and honest to build trust
Equity and external partners
Include other / external stakeholders

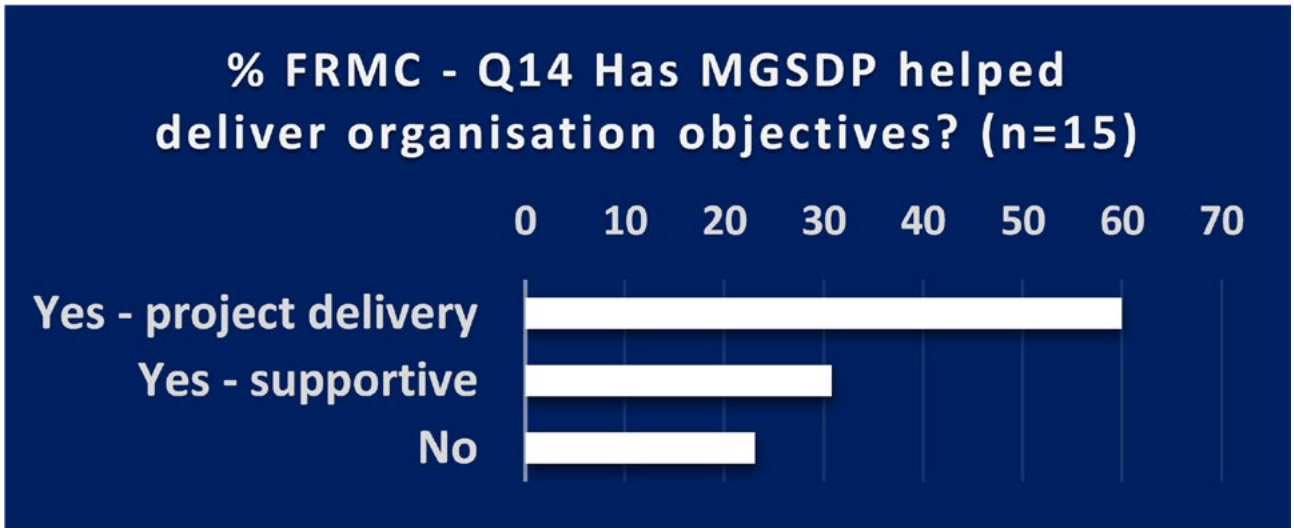

% FRMC - Q5 If MGSDP Didn't exist (n=14)
0
10
20
30
40
50
60
Fewer BGI / less multiple benefits
No vision / strategic plan
Silo working / less learning opportunities
Less diversity and skills
Missed Opportunities
Less investment / funding challenges
Longer to achieve solutions
Smaller projects

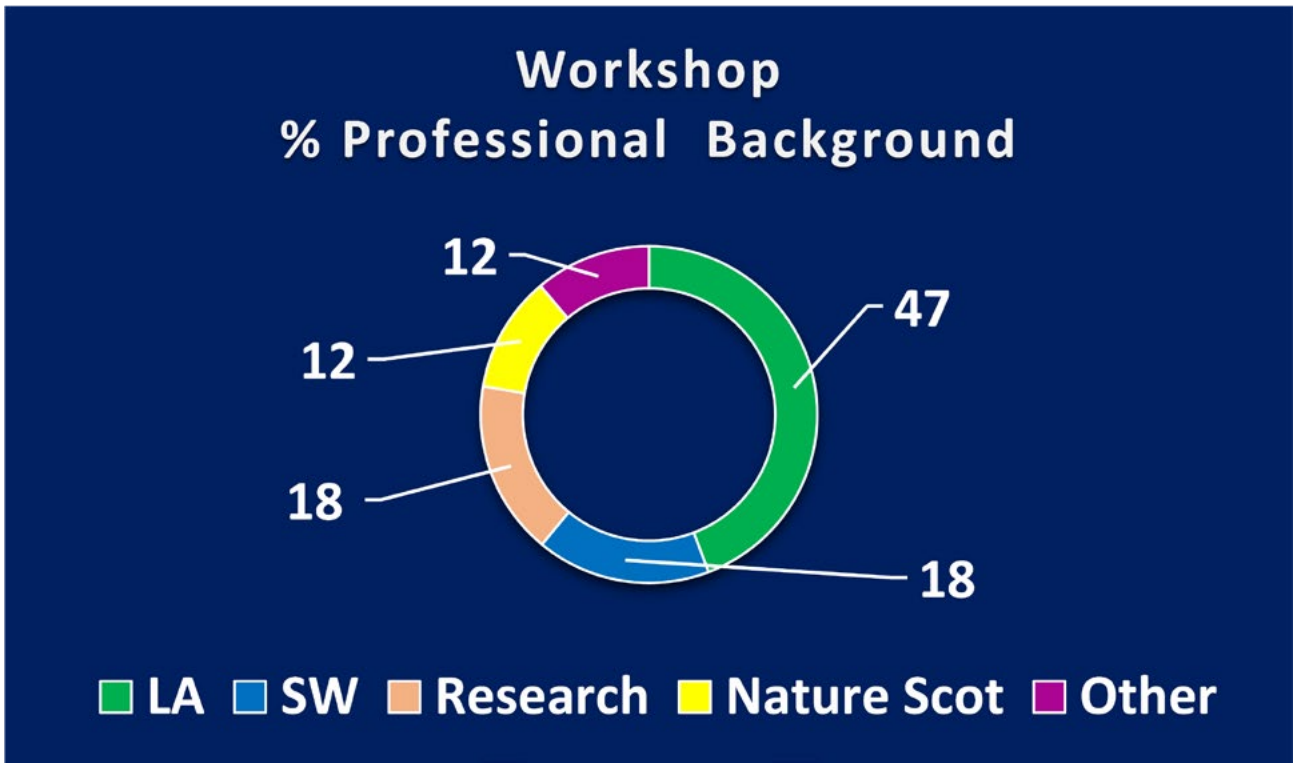

% FRMC - Q6 MGSDP Limitations (n=12)
0
10
20
30
40
50
60
Budget and resources
Silo working
Lack of Experience (new innovations)
Public exposure /Citizen buy-in

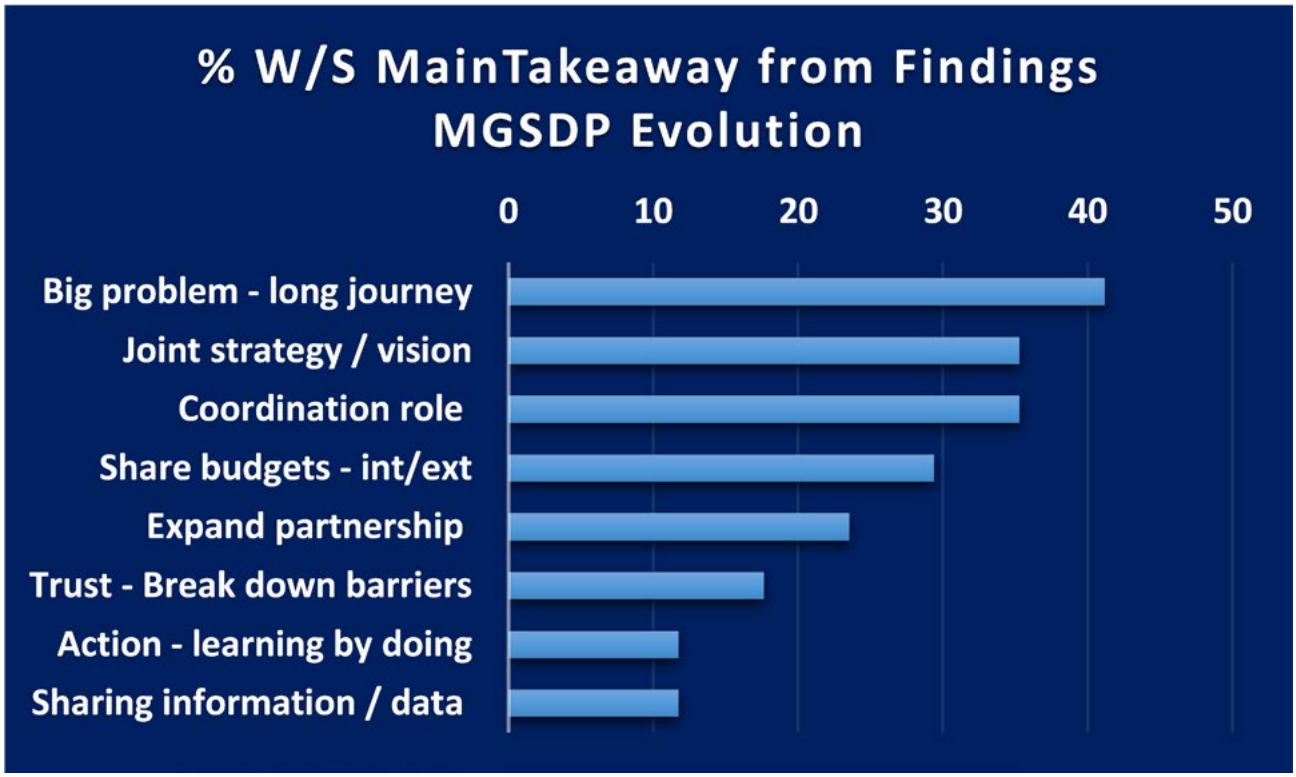

% FRMC - Q7 MGSDP Key Achievements (n=15)
0
10
20
30
40
50
60
70
Talk to action - delivery
Collaboration - objectives / coordination
Multifunctional solutions
Climate resilience / future proof
Skill diversity
Provided Case studies
Reinstating watercourses
Regeneration / unlock development

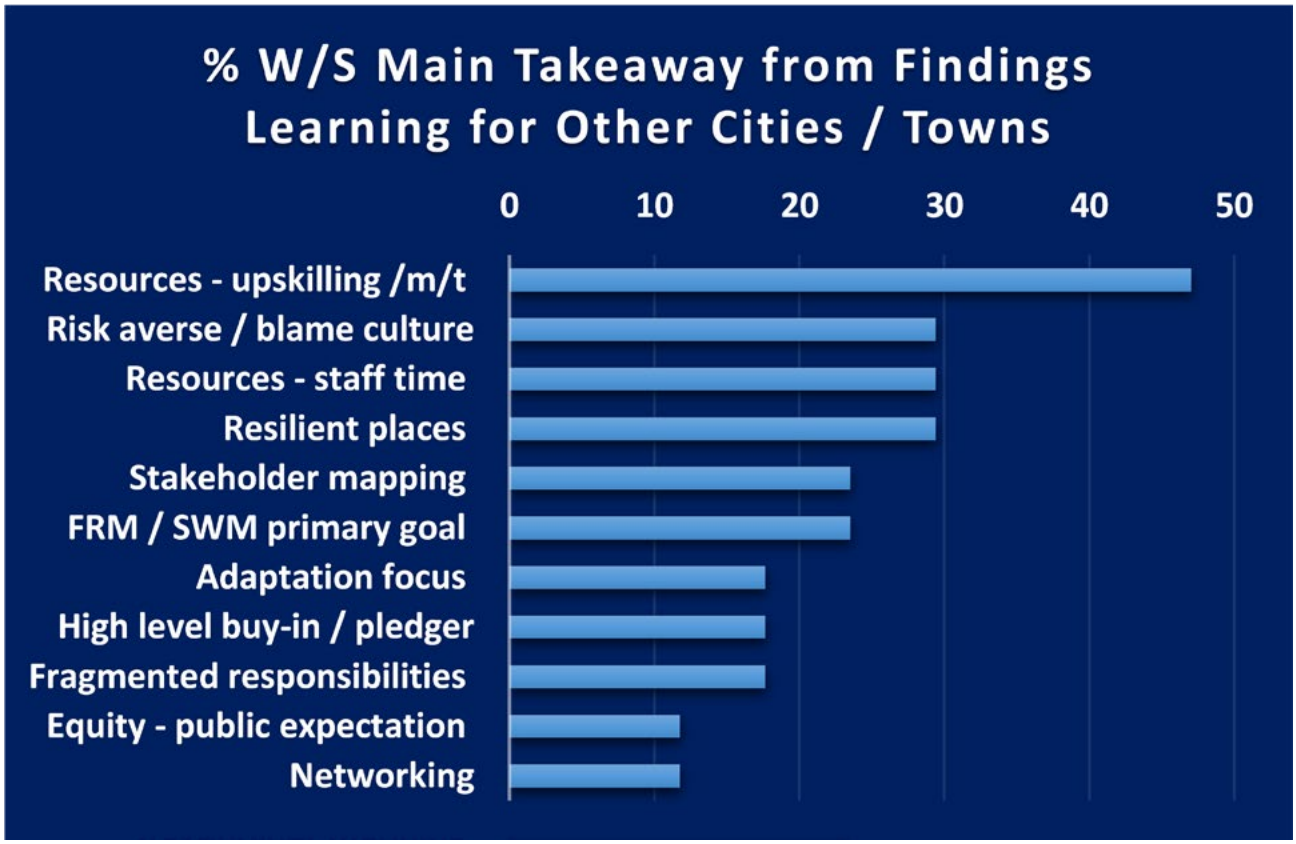

% FRMC - Q9 MGSDP Improve / do better (n=15)
0 5 10 15 20 25 30 35 40 45
Share lessons learnt / promotion
New (external) partners
Public Comms campaign
More focus on climate agenda
More innovation
New NBS guidance
M/t agreements

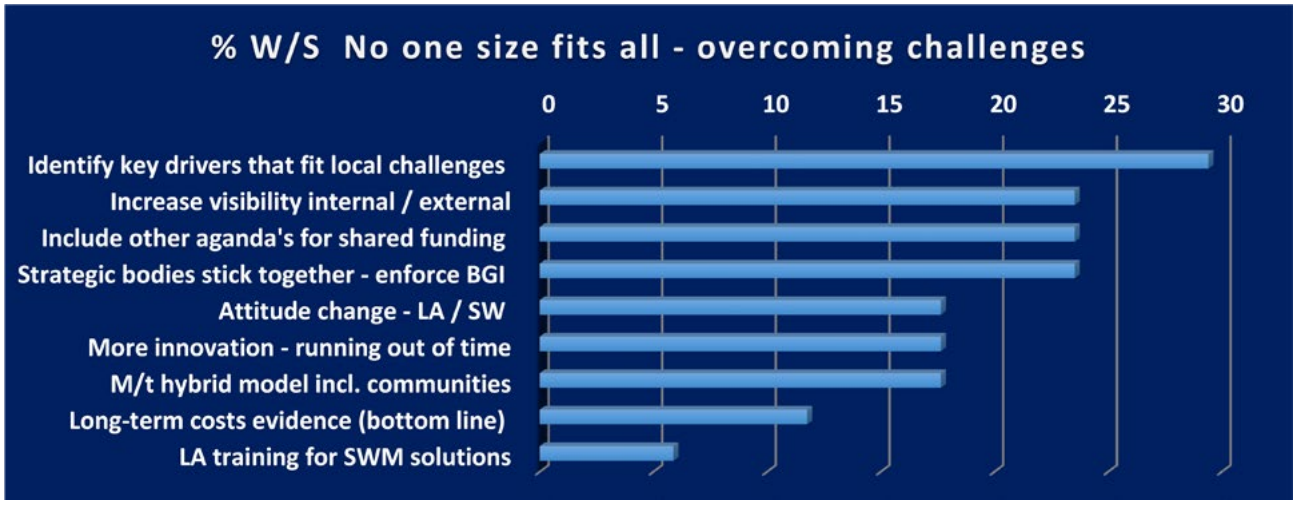

% FRMC - Q10 Replication of Partnership Approach (n=18)
0 20 40 60 80
Yes
Yes, but...
Being used already


% FRMC - Q14 Has MGSDP helped deliver organisation objectives? (n=15)
0 10 20 30 40 50 60 70
Yes - project delivery
Yes - supportive
No


Workshop
% Professional Background
12
47
12
18
18
LA
SW
Research
Nature Scot
Other


% W/S MainTakeaway from Findings
MGSDP Evolution
0
10
20
30
40
50
Big problem - long journey
Joint strategy / vision
Coordination role
Share budgets - int/ext
Expand partnership
Trust - Break down barriers
Action - learning by doing
Sharing information / data


% W/S Main Takeaway from Findings
Learning for Other Cities / Towns
0
10
20
30
40
50
Resources - upskilling /m/t
Risk averse / blame culture
Resources - staff time
Resilient places
Stakeholder mapping
FRM / SWM primary goal
Adaptation focus
High level buy-in / pledger
Fragmented responsibilities
Equity - public expectation
Networking


% W/S No one size fits all - overcoming challenges
0
5
10
15
20
25
30
Identify key drivers that fit local challenges
Increase visibility internal / external
Include other aganda's for shared funding
Strategic bodies stick together - enforce BGI
Attitude change - LA / SW
More innovation - running out of time
M/t hybrid model incl. communities
Long-term costs evidence (bottom line)
LA training for SWM solutions


% W/S Important for Collaborative Working
0
10
20
30
40
50
60
Share resources
Communication
Trust / no blame
Co-benefits for all
Shared goal / vision
Commitment
Coordinator
High level suport
Participation reward
Unique identity

Annex 3 Case Studies - Implementation of solutions Supplementary Information

The OECD studies on water governance concluded that solutions to water crises are now well understood. The real challenge is to implement solutions. These need to be tailored to local contexts, bringing together interdependent, fragmented public sectors to share risks and tasks and overcome obstacles (OECD, 2011). This research report provides an understanding of the MDSDP partnership management process across the various statutory bodies and how they have overcome silo working to develop a common aim and deliver solutions. This section provides brief supplementary examples of projects that have been facilitated by the Partnership over the last two decades as they developed technical expertise and grew in confidence to address cross-cutting local challenges of flooding, water quality, biodiversity enhancement and unlocking development constraints across the Metropolitan area.

The quality and innovative solutions delivered by the Partnership have been formally recognised by the industry. Examples include the Scottish Business Awards for Best Sustainable Development - Commonwealth Games Athlete's Village (2013); the Landscape Institute for Excellence in Sustainable Infrastructure - Sauchiehall Street (2020); the Water Industry Awards – Sustainable Drainage and Flood Management Initiative of the Year, Smart Canal (2021).

Project Types – Grey Blue and Green Infrastructure

Wesselink et al., (2015) distinguish between five types of FRM measures. Examples of initiatives and projects facilitated by the MGSDP and Partners were grouped according to this framework in Figure 6. Soft solutions alone present risks associated with failure in performance when compared with grey infrastructure and to face future challenges, hybrid Blue Green Grey (BGG) solutions used appropriately will be needed going forward (Ashley et al., 2020). Continuing to implement grey infrastructure alone reduces the potential to integrate softer solutions whereas implementing soft infrastructure provides flexibility for a range of options, including grey elements if needed.

Figure 6: Types of FRM measures implemented by the MGSDP and Partners (after Wesselink et al. 2015).

We undertook a count of project types found on the MGSDP website with a total of 59 projects noted. It is important to also note that BGG and Blue Green (BG) solutions represent one scheme or site with several solutions and that individual Partner organisations will have implemented projects within their day-to-day statutory duties that are out with the MGSDP influence (Figure 7).

Initially, solutions were implemented on a place-by-place approach to managing flood risk. As the Partnership developed technical expertise with implementing more holistic solutions, they have moved towards hybrid solutions delivered on a catchment wide cross boundary basis where upstream measures in one LA area benefit downstream LA areas. These solutions deliver multiple benefits over and above a flood management or water quality function. Many projects reduce the risk of flooding e.g., the North Renfrew Flood Prevention Scheme protects 376 homes. Other projects e.g., Shafton

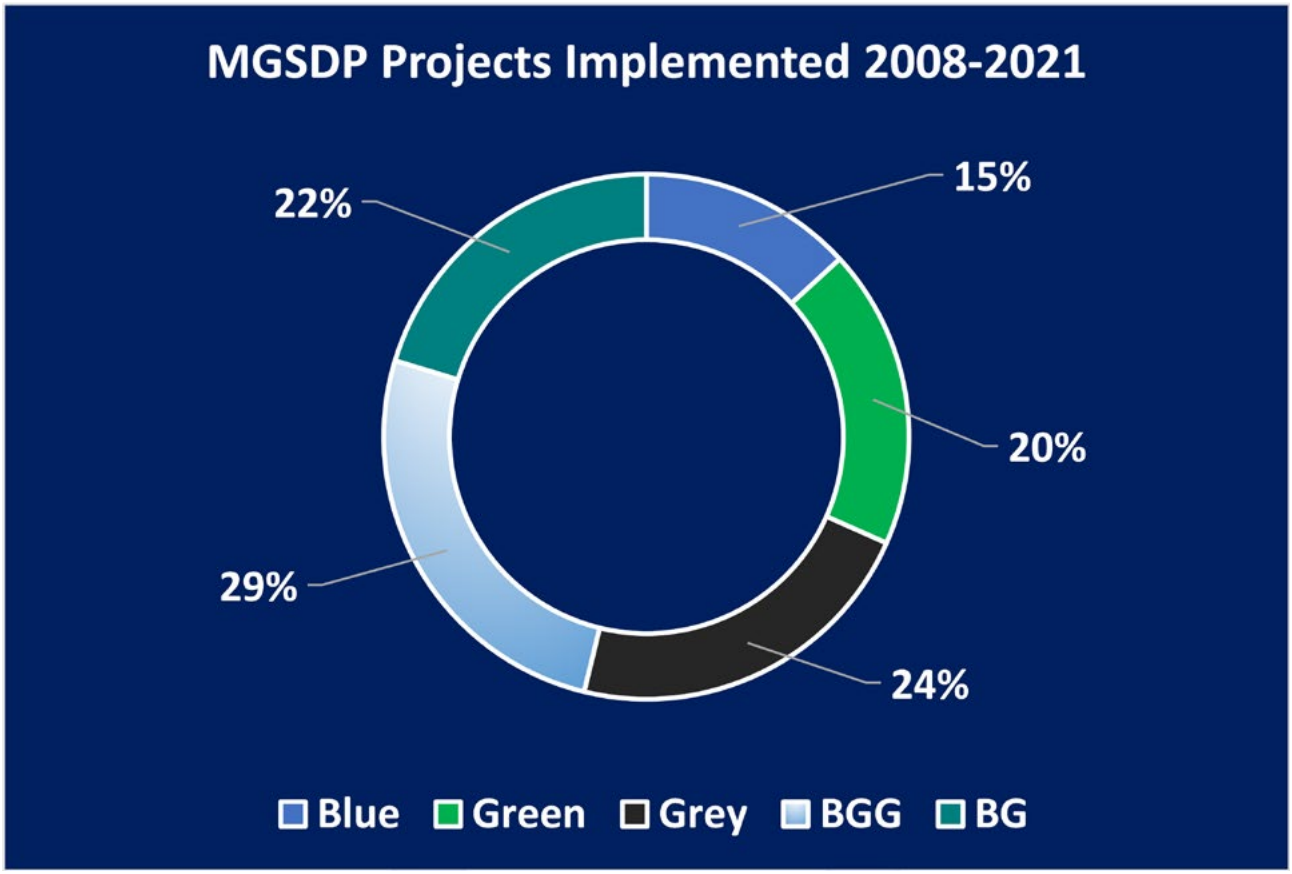


Figure 7: Types of projects implemented since 2008, BGG = Blue Green Grey, BG = Blue Green.

Road Flooding Project removed 60 homes from the at-risk flood register. Projects such as the Athlete Games Village and South Dalmarnock Regional SuDS have enabled the creation of homes while other projects support modernising existing infrastructure by addressing unsatisfactory combined sewer overflows and improving water quality.

Prevention and Preparation

The Flood Risk Management (Scotland) Act 2009 placed responsibility on Local Authorities (LA) to investigate causes of flooding and apply measures where appropriate. Strategies for FRM include development of SWMPs to reduce risk and impact of large flood events requiring a city-wide response. Stage 4 implementation of integrated sewerage and drainage infrastructure (BGG) is delivering the MGSDP LA Partner SWMPs. Glasgow City Deal funding has accelerated implementation of SuDS (BG) across the Metropolitan area (McKay, 2019).

Flood Protection – Sewer Improvements

Scottish Water Flood protection 'grey' projects include sewerage infrastructure improvements including capacity. The £100m 3.1-mile Shieldhall Tunnel in south Glasgow significantly improves water quality in the River Clyde and its tributaries by reducing the amount and frequency of CSO spills. It also increases capacity in the existing network reducing flooding at key locations (the MGSDP 2015, 2018).

Flood Mitigation – Nature and the Environment

Major projects such as the White Cart BGG flood prevention scheme based on catchment management principles reduces flood risk for ~1750 homes and businesses in the south of Glasgow from both fluvial and pluvial flooding and has resulted in the avoidance of ~£100m flood damages. Since 1908, more than 20 serious floods have occurred on the White Cart. Flood storage areas were constructed upstream of Glasgow to hold floodwater during extreme events. Flood defences were constructed in river corridors throughout the city. Design ensured flood defence walls did not reduce visual and environmental impact or community access to the river. In early 2011 the scheme was put to its first test reducing the impact of a one in ten-year flood with an estimated £3m saved in flood damages. Later that year an even larger event occurred with ~231 properties protected from flooding and £12m damage avoided. (CEEQUAL, 2011; McGowan and Douglas, 2013; the MGSDP, 2018).

Blue and green infrastructure has been implemented across catchments allowing cheaper and less obtrusive solutions to flood adaptation, providing multiple benefits such as ecological benefits and urban heat island reduction. For example, the

SuDS in Croftfoot Park were implemented on a former golf course improves water quality, enhances natural habitats and reduces runoff to nearby housing.

Flood Recovery – Regeneration / Retrofit

An example of successful multi-agency relationships can be seen with Clyde Gateway's Shawfield Remediation Strategy. The scale and complexity of infrastructure issues related to remediation of historical chromium hotspots meant that previous investment would be lost if solutions were not found. Partners worked collectively to overcome infrastructure issues over the long-term. This approach helped form Clyde Gateway Urban Regeneration Company which is now delivering a climate ready legacy that is transforming some of the most deprived communities in Scotland (the MGSDP, 2009). The South Dalmarnock Integrated Urban Infrastructure Framework developed by Clyde Gateway with the MGSDP is regenerating vacant public realm by retrofitting SUDS to reduce surface water flows to a combined network. The Carstairs Street and Conan Avenue 'diagonal walk' SUDS enhance the natural environment and treat surface water flows before final discharge to the River Clyde (the MGSDP, 2014).

References

Ashley. R., Gersonius, B., Horton, B. (2020). Managing flooding: from a problem to an opportunity. Phil. Trans. R. Soc. A 378: 20190214. http://dx.doi.org/10.1098/rsta.2019.0214

CEEQUAL. (2011). White Cart Flood Prevention Scheme. Available at: https://www.ceequal.com/case-studies/white-cart-flood-prevention-scheme/

McGowan, A. and Douglas, B. (2013). White Cart Water Flood Prevention Scheme a holistic catchment scale solution to reduce the risk of flooding that has blighted the south side of Glasgow for decades. Water Projects Online. River & Coastal and Flood Alleviation. Available at: https://waterprojectsonline.com/wp-content/uploads/case_studies/2013/White-Cart-Flood-Prevention-Scheme-2013.pdf [Accessed February 2022]

McKay, G. (2019). Delivering Surface Water Management Plans in Glasgow: Lessons Learnt. CIWEM UDG Summer Conference 2019.

OECD. (2011). Water Governance in OECD Countries: A Multi-level Approach. ISBN:9789264119284.

The MGDSP. (2009). The MGSDP Briefing Note 4 Autumn 2009 https://www.The MGSDP.org/CHttpHandler.ashx?id=37917&p=0 [Accessed February 2022]

The MGSDP. (2014). Briefing Note 13 - Summer 2014. Available at: https://www.The MGSDP.org/CHttpHandler.ashx?id=37924&p=0 [Accessed February 2022]

The MGSDP. (2015). Newsletter 2015 - Summer 2015. Available at: https://www.mgsdp.org/CHttpHandler.ashx?id=37925&p=0 [Accessed February 2022]

The MGSDP. (2018). Winter 2017-18 Newsletter. Available at https://www.The MGSDP.org/index.aspx?articleid=22121 [Accessed February 2022]

Scottish Government. (2009). The Flood Risk Management (Scotland) Act: Delivering Sustainable Flood Risk Management.; The Scottish Government: Edinburgh, UK, 2019; ISBN 978-1-78781-572-8.

Wesselink, A, Warner, J.F, Syed, M.A, Chan, F, Tran, D.D, Huq, H., Huthoff, F., Le Thuy, N., Pinter, N., van Stavern, M.F., Wester, P., Zegwarard, A. (2015). Trends in flood risk management in deltas around the world: Are we going 'soft'? International Journal of Water Governance, Volume 3(4), 25–46. doi:10.7564/15-IJWG90

Annex 4 Discussion and Lessons Learnt Supplementary Information

Phase one of this research investigated collaborative governance arrangements in the public sector and the evolution and impacts of the maturing Partnership that is the MGSDP via literature reviews. Phase two undertook stakeholder consultations including interviews, an online survey and workshops to gain an insight into lessons learnt, enabling factors to encourage the uptake of a partnership approach, obstacles to collaborations and the endurance of the collaborative approach as applied by the MGSDP. We conclude that a great deal has been achieved over two decades. Although governance is deemed successful, the pace of projects implemented has been slow according to some Partners and the FRML including critics in the FRMC. Due to the scale and complexity of the flooding issues in the Metropolitan and the time it takes to build trust in a broad partnership in order to resolve and integrate issues, this transition has been understandably slow.

Transition management (TM) is a governance methodology that encourages uptake of new generation socio-technical innovations such as urban water infrastructure by multi-disciplinary platforms and multi-actor processes (Geels 2005, Frantzeskaki & Rok 2018). As discussed in Annex 4; the initial analysis applied a TM Multi Level Perspective (MLP) approach illustrating that the success of the MGSDP can be attributed to a combination of top-down drivers (legislation that the Partnership itself informed) and bottom-up drivers supported by the implementation of pilot studies enabled by a strong group of actors and their co-developed strategy (common aim). Based on all findings from this review, the research team developed an iterative TM framework to help direct and focus the MGSDP activities at three levels going forward (Geels 2005, Jefferies and Duffy 2011; Duffy et al., 2013.) The following information provides more detail and discussion for proposed recommendations based on this TM Framework.

The inner and middle layers of the framework outline co-evolving and iterative activities. Evaluation and monitoring of solutions that have been implemented was identified as an area where the MGSDP can improve going forward as decisions made now will inform potential adaptation to vulnerabilities going forward for an uncertain future.

The outer layer illustrates governance levels where the MGSDP play a lead role in influencing how these levels interact with each other. The strategic (or landscape) level represents the Metropolitan area's drainage and sewerage infrastructure and long-term view (the MGSDP case is 40 years). The tactical (or regime) level represents the MGSDP Partners and external Stakeholders operating to shorter term agendas (5-15 years). The operational (or niche) level represents implementation of experimental projects/ novel practices. Governance activities to support and accelerate a transformative capacity trajectory are suggested at each level. Tactically, the strategic agenda remains modernisation of infrastructure through implementation of SWMPs to manage flood risk, improve water quality and contribute to the economy by unlocking development constraints. The vision currently under review at the strategic level has a suggested focus on the urgency to deliver equitable and water resilient communities that consider other drivers (biodiversity, well-being etc.) via regeneration and recovery. At the operational level, focus is directed towards niche development in the short term (1-5 years): speed up implementation of innovative solutions and practices; engage communities to better align with the place making agenda and initiate new collaborations / networks to bring new expertise to the Partnership that can assist with delivery of the strategic agenda to achieve the renewed vision.

References

Duffy. A., D'Arcy, B., Berwick, N., Wade, R., Jose, N. (2013), Source control SUDS Strategic Directions Report, CRWRR006 (CD 2012 27 R3). DOI: 13140/RG.2.2.12660.55687.

Frantzeskaki, N. & Rok, A., (2018). Co-producing urban sustainability transitions knowledge with community, policy and science. J Env Innovation and Societal Transitions 29 (2018) 47-51, https://doi.org/10.1016/j.eist.2018.08.001

Geels, F.W. (2005). The dynamics of transitions in socio-technical systems: A multi-level analysis of the transition pathway from horse-drawn carriages to automobiles (1860–1930), Technology Analysis & Strategic Management, 17:4, 445-476, DOI:10.1080/09537320500357319

Geels, F and Kemp, R. (2000). Transitions from a societal perspective. UNU-MERIT Maastricht, The Netherlands.

Jefferies C., Duffy A. (2011). The SWITCH Transition Manual. University of Abertay, Dundee, Scotland. ISBN 978-1-899796-23-6. http://www.switchurbanwater.eu/outputs/pdfs/W1-3_GEN_MAN_D1.3.4_SWITCH_Transition_Manual.pdf [Accessed February 2022]

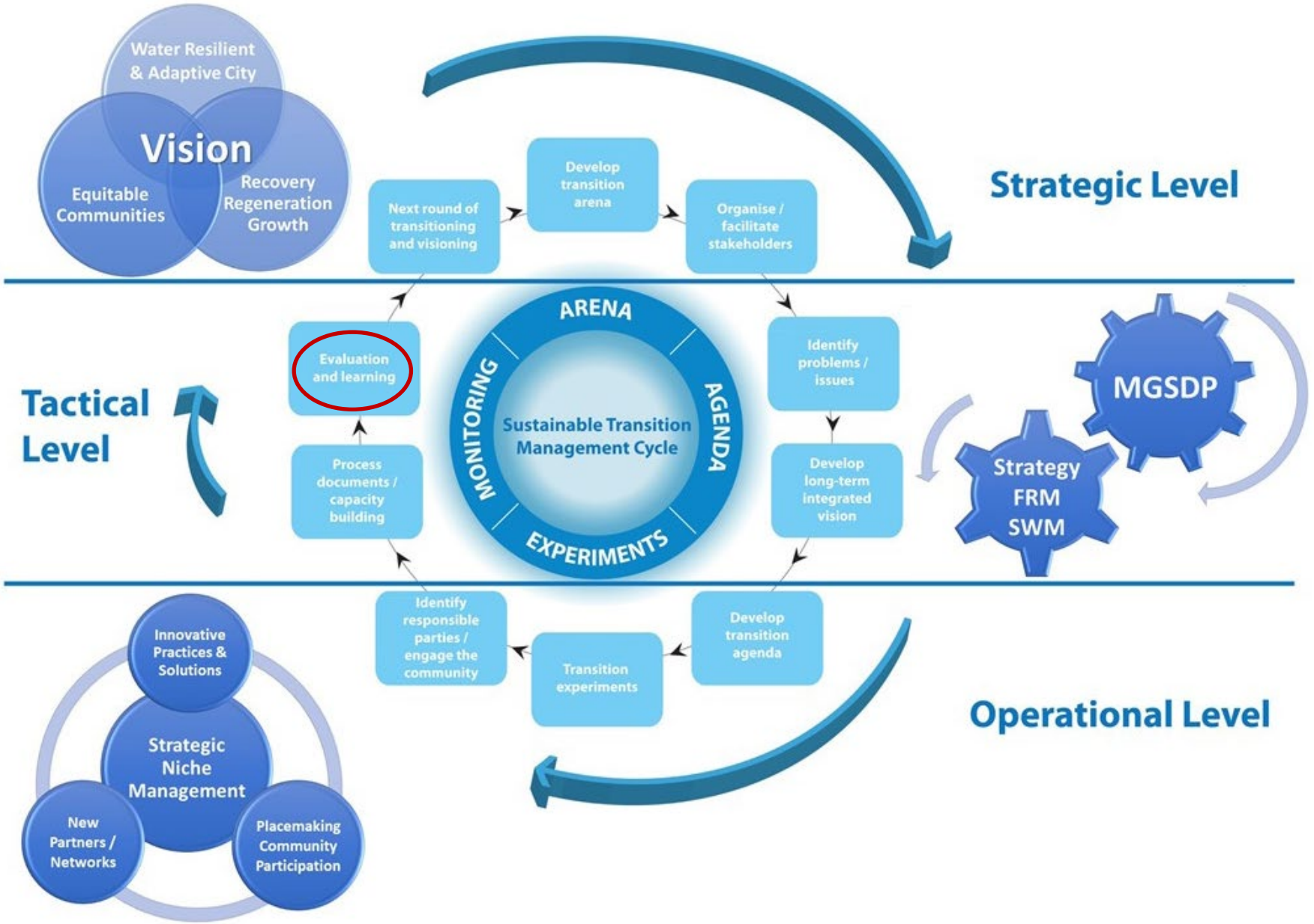


Figure 8: The MGSDP Transition Management Framework (adopted from Geels et al 2005 and adapted from Duffy et al 2013)

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