Adapting to Rising Tides project
www.adaptingtorisingtides.org

ART Alameda County Project

Initiated in 2011, the ART Alameda County Project was the first in the region to evaluate current and future flooding across multiple jurisdictions and sectors

Key factors of the ART approach – collaborative by design, a transparent process, and sustainable from start to finish – were foundational to the project

Project Area

Working Group

ART emphasizes close collaboration among local, regional, state and federal stakeholders to develop a shared understanding of issues, build trust, and achieve buy-in for collaborative problem solving

Asset Categories

- Airport
- Community facilities and services
- Contaminated lands
- Energy, pipelines and telecom
- Flood control
- Hazardous material sites
- Ground transportation
- Parks and recreation
- Natural shorelines
- Residential land uses
- Seaport
- Storm water
- Structural shorelines
- Wastewater

The ART project was initiated in 2011 in Alameda County. It was the first adaptation planning effort in the region to conduct an assessment and development adaptation responses across jurisdictions and assets. The project's approach to collaboration, using a working group to develop information and ground truth findings and using meetings to conduct the work of the project, was considered innovative and effective. ART's identification of four frames of sustainability- society and equity, environment, economy and governance and consideration of these four frames of sustainability from the development of the existing conditions information to who was in the room to the development of adaptation responses was an important foundation that the project carries forward.

ART Alameda Project Outcomes

- **Issue papers** on Governance and Social Vulnerability
- A proven **assessment approach**
- **Reports** on existing conditions, vulnerability and risk, and adaptation responses
- Sector-specific **communication materials**, e.g., profile sheets
- **Adaptation responses** for all vulnerabilities identified
- **Capacity building** at local, regional, state and federal levels
- Resulted in **further assessments** and **response refinement** by working group members

The project resulted in the development of an approach and process for future adaptation planning efforts that was designed to make future efforts easier and more efficient and allow for new efforts to build off of previous projects. Several issues, including governance and social vulnerability were evaluated in greater detail through issue papers that informed the approach to future work and findings. The assessment questions that were developed for the project and refined through coordination with topic and issue area experts ensured that the information collected for the project was the right information and data to support the development of adaptation responses. We also learned through working with our working group that it is important to develop different ways to communicate and summarize findings- so we developed one pagers, two pagers, profile sheets and other ways to quickly and efficiently communicate the project. The work we did with the working group resulted in building our capacity and building the capacity of our federal, state, regional and local working group members. The capacity served as a foundation for other adaptation planning efforts with the Metropolitan Transportation Commission, Capitol Corridor, Bay Area Rapid Transit, East Bay Regional Park District and others. It also supported work that we began to do to coordinate projects between BCDC's ART program and the Association of Bay Area Government's resilience program.

The ART Alameda project also led to the development of the ART approach and the ART planning process, that was developed to ensure that the components of the approach were carried forward in the ART planning process. In other words, that our good intentions regarding collaboration, sustainability and transparency were carried forward in the planning process steps we took. The ART approach includes the following critical components:
Sustainability from start to finish
A core aspect of ART is consideration of the relevance and implications of all aspects of sustainability in each step of the planning process, from who is included in the initial working group list to what evaluation criteria are selected to evaluate adaptation responses.

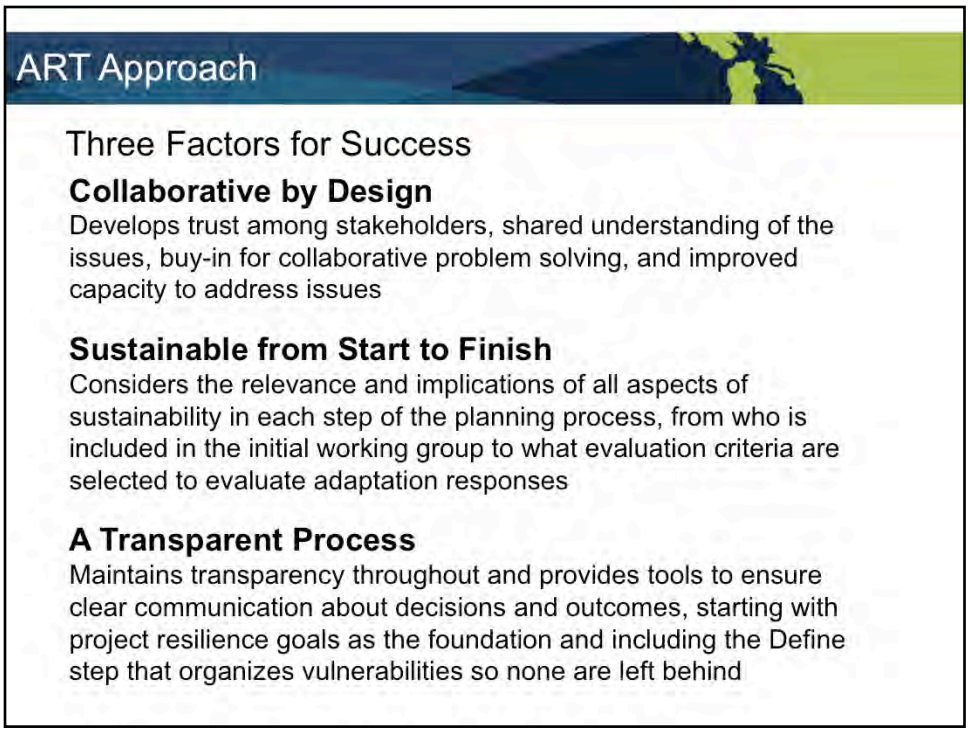
Convene a working group with diverse perspectives and expertise
Develop shared understanding of issues, trust among stakeholders, and buy-in for collaborative problem solving. Improve capacity among stakeholders to understand and address climate change issues.

Conduct a robust and transparent assessment using the ART Assessment Questions
Understand underlying causes and components of vulnerability and consequences – taking into consideration all aspects of sustainability – for individual assets and components, the project area and sectors and services evaluated. Easily validate findings with input from working group members, topical experts and those with local knowledge.

Develop clear outcomes and communications materials
Summarize assessment findings into concise statements and develop materials that clearly communicate planning issues and identify actionable characteristics to a wide variety of audiences.

A transparent process
To build a strong and actionable case for adaptation, the ART approach adheres to transparent decision-making throughout the planning process. ART guidance, tools and information help maintain transparency and support clear communication to stakeholders about the decisions and project outcomes, including resilience goals developed and agreed upon by the working group and evaluation criteria that clearly lay out priorities and objectives.

Develop adaptation responses for planning issues
Establish a clear road map for taking action on planning issues by collaboratively developing adaptation responses with one or more actions as well as implementation options to address underlying vulnerability(s). Rather than a list of actions or strategies, make implementation real and possible by clarifying roles and responsibilities and timing and sequencing of adaptation actions within responses and identifying individual and collective next steps for getting started on these responses to set the stage for working group members to launch new efforts and collaborations that have a “life



The ART Alameda project also led to the development of the ART approach. The ART approach includes the following critical components:

Sustainability from start to finish
A core aspect of ART is consideration of the relevance and implications of all aspects of sustainability in each step of the planning process, from who is included in the initial working group list to what evaluation criteria are selected to evaluate adaptation responses.

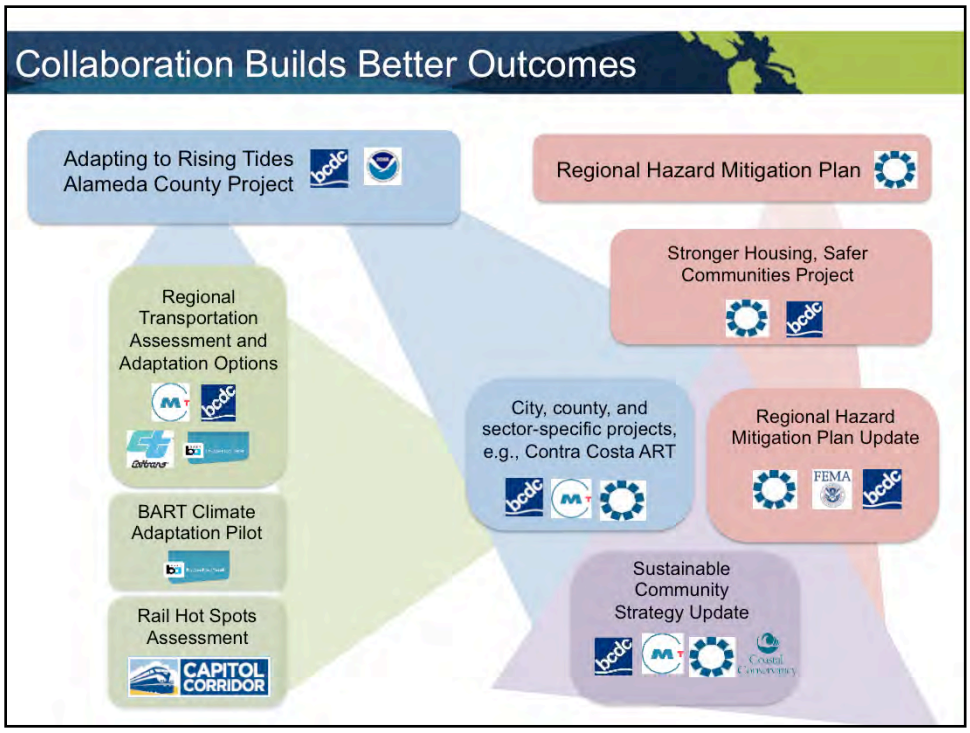
Convene a working group with diverse perspectives and expertise
Develop shared understanding of issues, trust among stakeholders, and buy-in for collaborative problem solving. Improve capacity among stakeholders to understand and address climate change issues.

Conduct a robust and transparent assessment using the ART Assessment Questions
Understand underlying causes and components of vulnerability and consequences – taking into consideration all aspects of sustainability – for individual assets and components, the project area and sectors and services evaluated. Easily validate findings with input from working group members, topical experts and those with local knowledge.

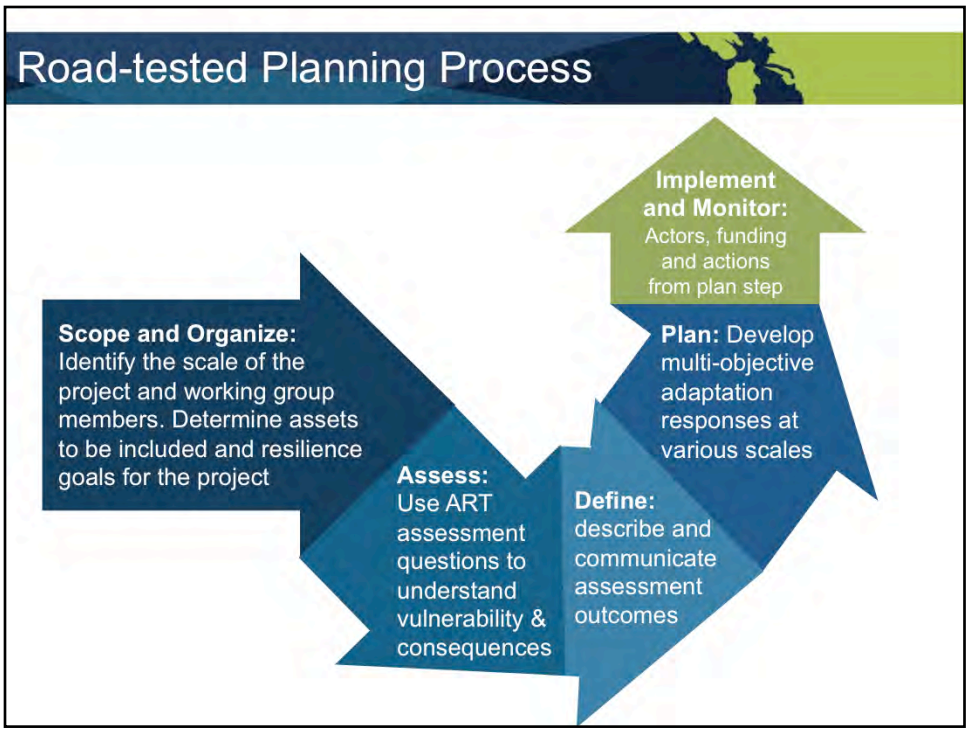
Develop clear outcomes and communications materials
Summarize assessment findings into concise statements and develop materials that clearly communicate planning issues and identify actionable characteristics to a wide variety of audiences.

A transparent process
To build a strong and actionable case for adaptation, the ART approach adheres to transparent decision-making throughout the planning process. ART guidance, tools and information help maintain transparency and support clear communication to stakeholders about the decisions and project outcomes, including resilience goals developed and agreed upon by the working group and evaluation criteria that clearly lay out priorities and objectives.

Develop adaptation responses for planning issues
Establish a clear road map for taking action on planning issues by collaboratively developing adaptation responses with one or more actions as well as implementation options to address underlying vulnerability(s). Rather than a list of actions or strategies, make implementation real and possible by clarifying roles and responsibilities and timing and sequencing of adaptation actions within responses and identifying individual and collective next steps for getting started on these responses to set the stage for working group members to launch new efforts and collaborations that have a “life of their own.”



This leads to one of the important findings from the ART Alameda project and that is that collaboration leads to outcomes and allows you to leverage the work, data, processes and relationships that were developed to support further work on a variety scales and leads towards action. This graphic demonstrates the way that projects that started separately back in 2011, are now, in 2015, being brought together in way that makes the work more meaningful, more efficient, easier to participate in and reduces conflicts and confusion for stakeholders. By bringing the work for current and future hazards together it is possible to work with stakeholders together on preparing for both issues, rather than having agencies and organizations participating in two separate, but similar, efforts.



The planning process developed as part of the ART projects includes important components to ensure that the intentions of the ART approach are carried forward. The steps, include

Scope and Organize

Identify the project scope and scale, project area, assets to be evaluated, the working group members and develop the resilience goals for the project.

Assess:

Using the ART assessment questions, develop the findings on vulnerability and consequences for the assets, services and issues in the project area and create current and future flooding or hazard exposure maps.

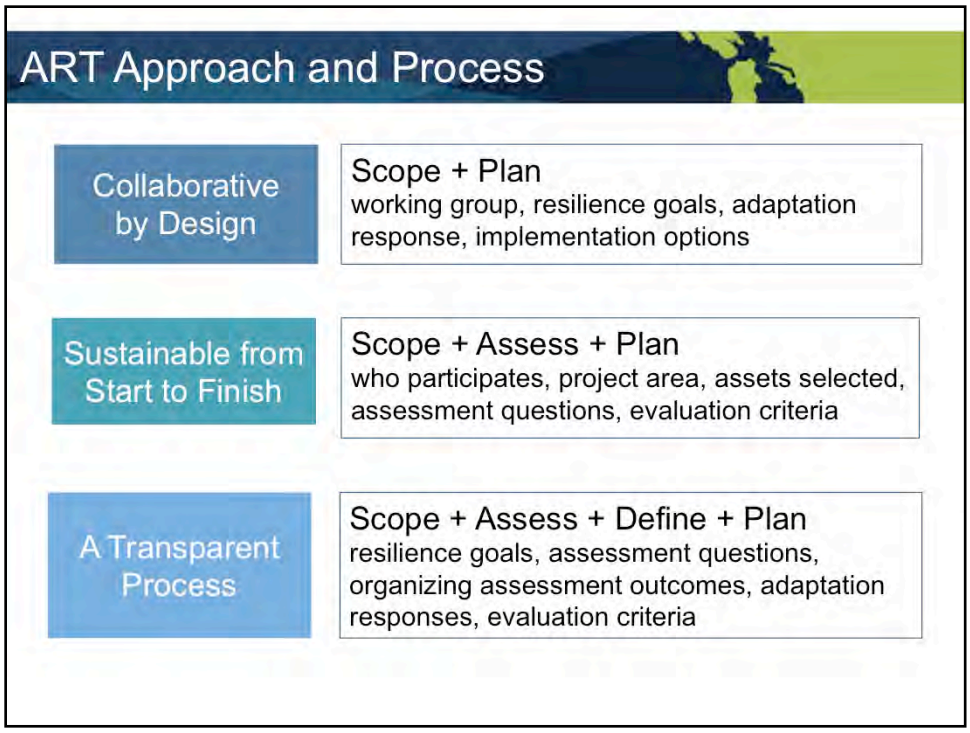
Define:

Categorize the vulnerabilities identified based on the type of vulnerability- governance, information, physical and functional and the water level that the asset, service or issue would be exposed, the consequence of that exposure, and other factors considered important to categorizing and prioritizing into key issue statements.

Plan:

Develop adaptation responses for the vulnerabilities identified at the scales assessed- from regional and sector scale- to the asset specific and component scale.

Implement and Monitor:



Throughout our work leading and supporting efforts around the region, we begin to refine the adaptation planning process that we were using to ensure that the critical components of the ART approach are included in the planning process.

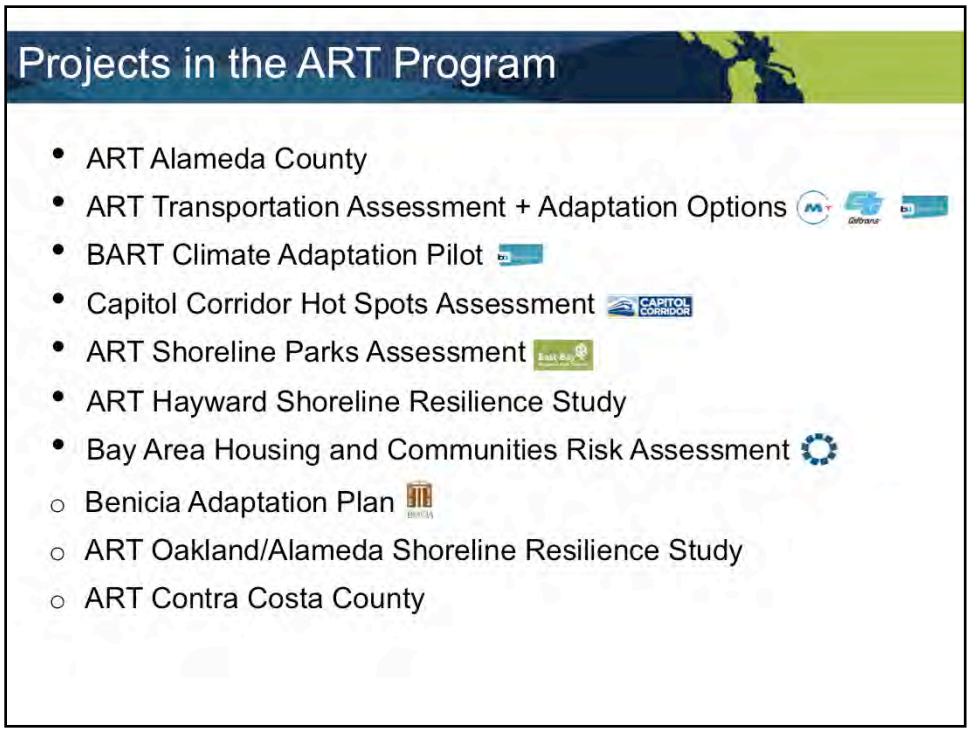
The ART Program

Transitioned from leading a single county effort to a regional program that uses findings, processes, tools and relationships developed in ART Alameda to lead and support:

- efforts at multiple geographic scales
- efforts that are multiple or single sector

For example, Hayward and Oakland/Bay Farm Island focus area studies, Capitol Corridor hot spots assessment, City of Benicia Adaptation Plan, Marin County shoreline planning, and regional resilience planning with ABAG, MTC, Caltrans and BART

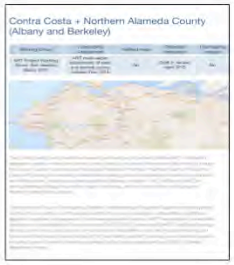




The projects in the ART Program include some that we have led or are leading and others that we have assisted with or been co-leads on. Many of the projects that are on this list came directly out of the work that we started in Alameda County and built from the processes and information that we developed in the project.

ART Program Objectives

- Provide guidance and support to help jumpstart successful adaptation efforts at all scales (local, regional, state and federal)
- Leverage best available data, information and research to support local and regional efforts
- Continue to develop and refine approaches that lead to action
- Support a consistent approach to coordinating, collaborating and identifying regional issues and priorities actions



In moving from the ART Alameda project into the ART program, we have begun to identify objectives that go beyond leading adaptation planning efforts and include other objectives to support the building of regional resilience through a number of avenues. These objectives include not only ART, but the participation of a number of agencies and organizations that started out as working group members in ART Alameda:

ART Program Resource: Portfolio

An on-line resource with information to help understand and address the specific challenges of building resilience across different assets, jurisdictions and owners

- **Findings:** ART Program outcomes summarized by sector and planning issue
- **Projects:** Latest information about current and past projects of the ART Program
- **How-to:** Background information and step-by-step guidance and supplies for leading an adaptation project
- **Help-desk**: Connect to knowledgeable ART Program staff

ART Program Objectives

- Develop funding sources, information and capacity at the regional scale that supports and enhances efforts at local, state and federal scales
- Provide input at the federal and state level to ensure grants and guidance are responsive to Bay Area issues
- Engage in regional collaborations that seek to align regional resilience efforts and ensure stronger, consistent outcomes across all sectors and geographies

ART Program Collaboration

The ART Program is coordinating to help align the Joint Policy Committee's resilience work, ABAG's Resilience Program, MTC's transportation planning and Coastal Conservancy's efforts

Together we are using regional data, tools, maps and models to inform joint planning efforts, including:

- 2017 update to Plan Bay Area's Sustainable Community Strategy
- 2016 Hazard Mitigation Plans update
- Ongoing city, county, and sector-specific vulnerability assessments

ART Program in Contra Costa

The ART Program team is using findings, tools and processes from previous ART-lead and supported projects to jumpstart the Contra Costa ART project

Previous work will make every step more efficient and effective, including:

- Identification of current and future flooding
- Adaptation planning process
- Adaptation response development

Contra Costa ART Project

ART Contra Costa Project

Expected Outcomes

- Assessments of multiple assets at the **sector, system, individual asset** and **component scale**
- **Consequences** of the failure or disruption of the assets and systems assessed
- Asset and agency **specific vulnerabilities**
- Vulnerabilities and responses that **cross jurisdictions** and affect **multiple assets**
- Adaptation responses that include **specific actions**, **actors, possible funding sources** and implementation tools
- Early and **priority actions** identified
- Increased **capacity** of working group members
- **Communication** materials and support

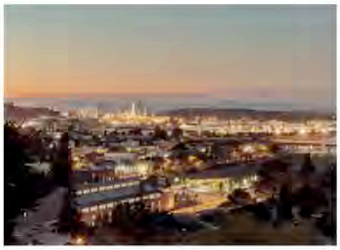
Adapting to Rising Tides project
www.adaptingtorisingtides.org


Project Timeline
ART Contra Costa Project
Project Initiation – Fall 2014
Project Scoping – Fall/Winter 2015
Conduct Assessment – Winter/Spring 2015
Determine Assessment Outcomes – Summer 2015
Transition to Adaptation – Fall 2015
Develop Adaptation Responses – Winter 2015
Evaluate and Select Adaptation Responses + Opportunities for Implementation – Spring 2016
Working Group Meeting
Individual or small group meetings


Project Scoping and Assessment
ART Contra Costa Project
SCOPE & ORGANIZE
Convene Partners & Stakeholders
Choose Project Area
Identify Sectors, Services, Assets
Select Climate Scenarios & Impacts
Set Resilience Goals
ASSESS
DEFINE
PLAN
IMPLEMENT & MONITOR

Project Working Group

ART Contra Costa Project



- **County Agencies:** Conservation and Development, Flood Control, Public Works, Health Services, Mosquito and Vector Control Office of Emergency Services
- **Cities:** Planning and Public Works
- **Special Districts:** Water, Wastewater, Parks
- **Regional, State and Federal Agencies:** ABAG, MTC and many Transportation Agencies
- **Private Entities and Non-Governmental Organizations:** Power, rail, refineries, industrial alliances and councils, community based organizations

Roles & Responsibilities

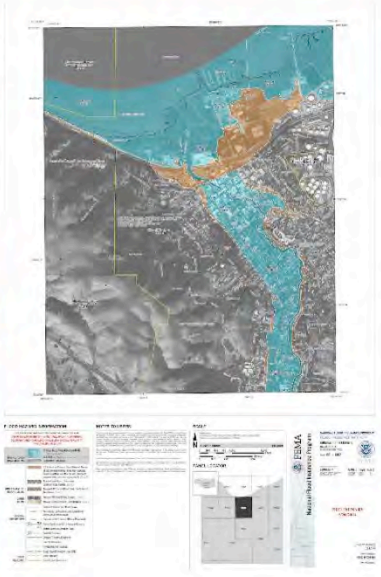
ART Contra Costa Project

- **Project Team:** leads and manages the project, engages the working group, completes work products
- **Working Group:** actively participates in the project, attends project meetings, provides local data and knowledge, communicates project to their own stakeholders to bring additional expertise and perspectives to the project
- **Other Stakeholders:** a wide range of organizations and individuals with interests and perspectives that can provide feedback on project components and outcomes

Project Area

ART Contra Costa Project

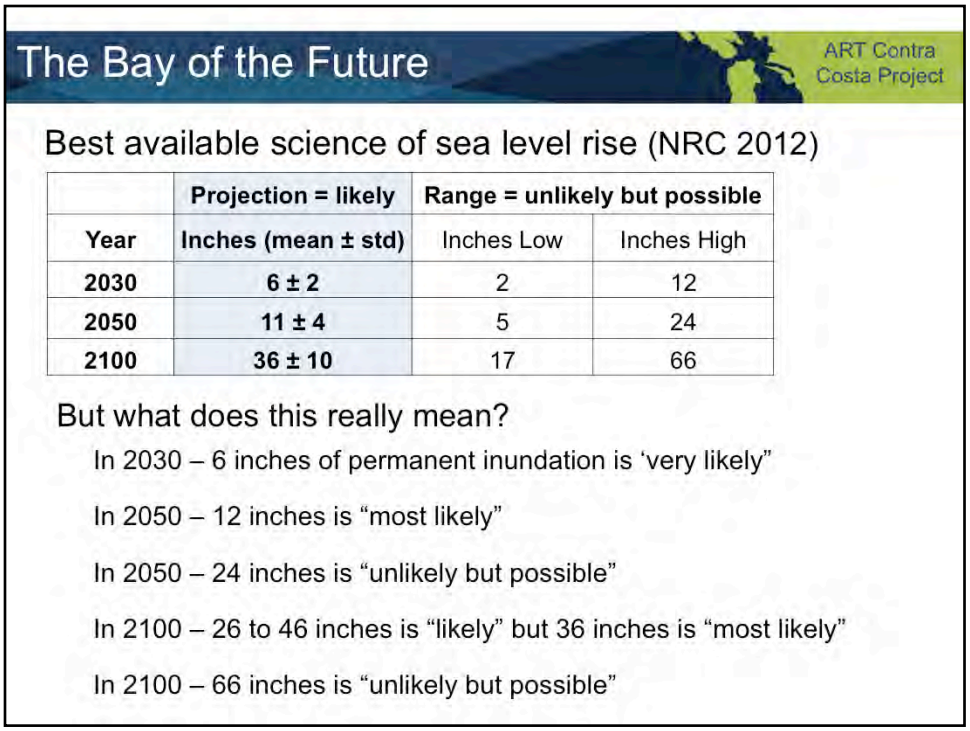
The shoreline from Richmond to Bay Point, including areas potentially exposed to current and future coastal flooding from up to 9 feet above current high tide, and the current 1% annual chance (100-yr) riverine flood



Impacts of Sea Level Rise

ART Contra Costa Project

- More frequent flooding in existing flood-prone areas
- More extensive, longer duration flooding
- Permanent inundation
- Shoreline erosion and overtopping
- Elevated groundwater and increased salinity intrusion



Projections for south of Cape Mendocino, relative to 2000

The A1 scenario family assumes high economic growth, low population growth that peaks mid century, and the rapid introduction of more efficient technologies.

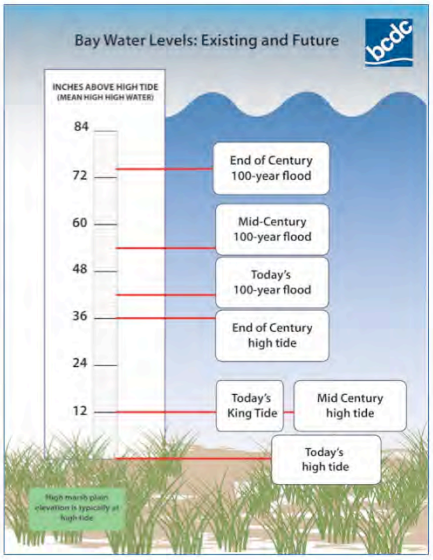
- A1B (balanced)
- A1FI (fossil fuel intensive)

The B1 scenario family assumes the same low population growth as the

Today's Bay

ART Contra Costa Project

- The average daily high tide is generally at high marsh levels
- King Tides are astronomical tides that annually elevate the Bay 12" above the daily high tide
- Today's 100-year storm surge tide can elevate the Bay 42-48" above the daily high tide

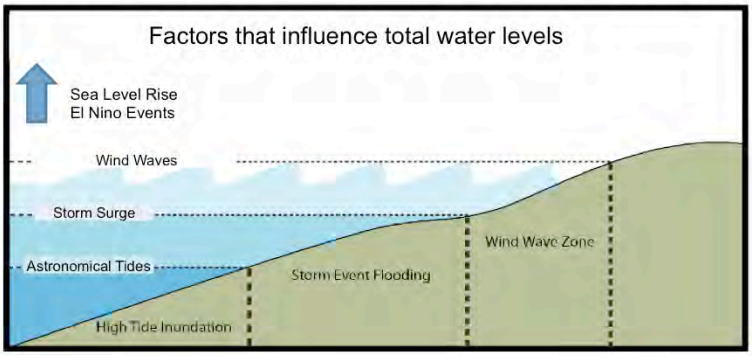


Understanding Today and Tomorrow

ART Contra Costa Project

The Total Water Level Approach

- Helps overcome challenges of scenario selection by using a limited number of maps to depict a larger number of possible futures
- Helps communicate that areas that may be *permanently inundated* will first be *temporarily flooded*
- Provides a deeper understanding of action thresholds and triggers



One Map, Many Futures

ART Contra Costa Project

Permanent Inundation

High tide with 48” SLR (likely 2100)

or

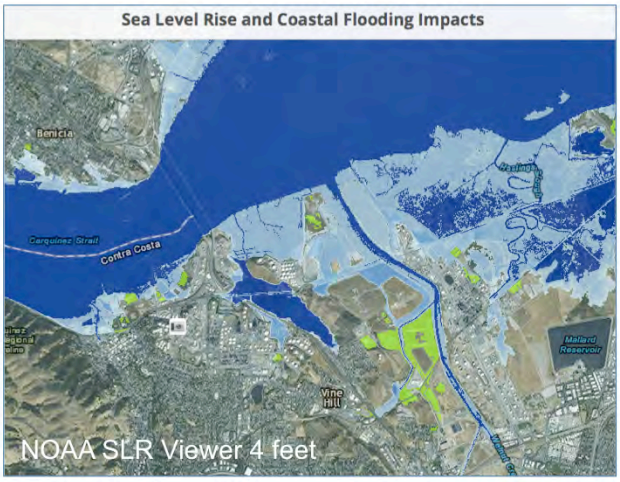
Temporary Flooding

1-year tide with 36” SLR (most likely 2100)

25-year tide with 12” SLR (most likely 2050)

50-year tide with 6” SLR (very likely 2030)

100-year tide (today!)



Sectors and Assets

ART Contra Costa Project

Community Characteristics
Individual, household, neighborhood demographics

Residential Housing
Single and multi-family, senior, dependent housing

Community Facilities and Services
Public health infrastructure
Emergency facilities and services
Community facilities
Waste collection and transfer stations

Industrial Land Uses
Industrial land uses (zoning or assessor's data)
Contaminated Lands
Hazardous Materials Sites
Landfills (closed and open)

Parks and Recreation Facilities
Shoreline parks
Bay trail and water trail
Marinas
Fishing piers

Water Management
Water supply
Wastewater
Flood management
Stormwater infrastructure

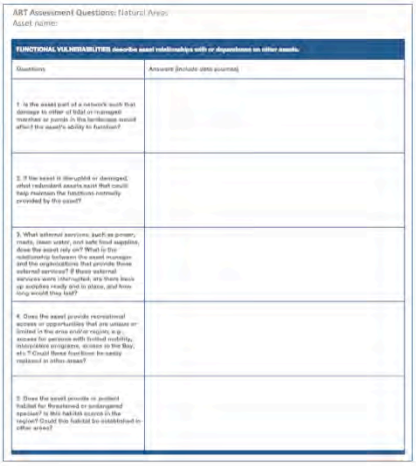
Transportation
Passenger and freight rail
Local, state and interstate road network
Bay trail
Seaport (Port of Richmond)
Marine oil terminals

Energy and Fuel Supply
Pipelines
Refineries
Power generation
Power distribution (substations)

Assessment Approach

The core of an ART assessment: sector-specific assessment questions:

- Questions are organized based on the types of vulnerabilities and consequences often observed
- The questions can be answered for all assets at different asset scales, or for representative assets



ART Assessment Questions: Natural Areas

Asset name:

FUNCTIONAL VULNERABILITIES describe asset relationships with or dependence on other assets.	
Questions	Answers (include data sources)
1. Is the asset part of a network such that damage to either of tidal or managed marshes or ponds in the landscape would affect the asset's ability to function?	
2. If the asset is disrupted or damaged, what redundant assets exist that could help maintain the functions normally provided by the asset?	
3. What external services, such as power, roads, clean water, and safe food supplies, does the asset rely on? What is the relationship between the asset manager and the organizations that provide those external services? If those external services were interrupted, are there back up systems ready and in place, and how long would they last?	
4. Does the asset provide recreational access or opportunities that are unique or limited in the area and/or region, e.g., access for persons with limited mobility, interpretive programs, access to the Bay, etc.? Could these functions be easily replaced in other areas?	
5. Does the asset provide or protect habitat for threatened or endangered species? Is this habitat scarce in the region? Could this habitat be established in other areas?	

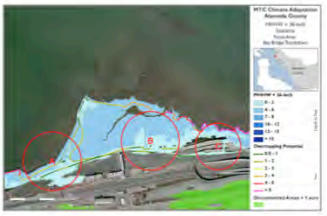
Assessment Approach

The ART team has been compiling preliminary assessment information by:

- Gathering preliminary answer to the assessment questions using readily available information and by contacting working group members
- Summarizing exposure to current and future flooding in maps, tables, charts and summary statements

ART Assessment Questions: Flood control/stormwater
Asset name: Novato Creek (confluence reach in downtown Novato)

GOVERNANCE VULNERABILITIES describe challenges with management, regulatory authority, or funding.	
Questions	**Answers** (include data sources)
1. Is the asset managed to achieve multiple goals or objectives e.g., habitat, water quality, flood control, recreation, shoreline access, etc.? If yes, are their conflicts among them?	Novato Creek is managed for flood protection and wildlife habitat, including water quality and threatened and endangered species, and conflicts primarily arise when maintenance dredging permits are required (see FC 2.0 for more detail).
2. If the asset owner and manager are different, what is the relationship between them, e.g., a legal agreement such as a lease, right-of-way, access easement, MOU or MOA?	NA
3. Describe any plans that are relevant to asset management or improvement, e.g., Master Plan, Capital Improvement Plan, and if/how they consider sea level rise.	As part of current planning effort, MCFCD is evaluating 18" and 36" SLR to design a resilient, geomorginic dredge template. Riverine flooding of downtown Novato is more of a concern than coastal flooding of undeveloped baylands.
4. If the asset is protected from flooding by land or assets owned or managed by others (e.g., natural areas, structural protection, roadways), what is the relationship between the asset owner/manager and these entities? Do they coordinate information, funding or decision-making?	MCFCD is working with the City of Novato, Novato Sanitary District, and North Marin Water District to improve channel conveyance of flow and sediment. SLR will increase backwater flooding and SMART and Hwy 37 bridges are significant constraints, yet these stakeholders are not actively involved in stakeholder process.
5. What types of permits (and from which agencies) are necessary to maintain, repair or improve the asset? Are there special processes for emergency repairs?	Permits from local, state, and federal agencies are required, e.g., BCDC, RWQCB, CDFW, NMFS, USFWS and USACE, both to complete maintenance dredging and capital projects.
6. What funding sources currently exist that can be used to assess hazard risk or vulnerability to climate change? To improve asset resilience?	As a whole, MCFCD has no source of funds – flood zone annual revenues come from property tax and in some cases special taxes or fees (varies widely depending on property tax base of the zone and pre-proposition 13 tax rates). The Board of Supervisors approved using general funds to plan Novato Creek improvements. No funding sources currently exist for capital projects - a ballot measure, grant funding such as IWMP, partnerships, etc. would be need to implement preferred alternative.



Assessment Approach

The next step is to enhance and validate the assessment findings:

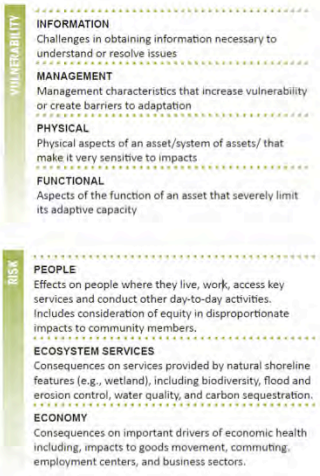
- Obtain input (reports, data, maps) from working group members, topical experts, and those with local knowledge
- Ask working group members and others to review preliminary assessment answers and exposure analysis

- ✓ Individual meetings
- ✓ Small group meetings
- ✓ Phone interviews
- ✓ Email
- ✓ Field visits

Determining Assessment Outcomes

Assessment answers are summarized into clear, outcome-oriented statements

- Assessment answers are used to develop brief issue statements that describe the vulnerabilities and consequences of the sectors, asset categories, and specific geographies evaluated
- Issue statements are organized based on types of vulnerability and consequences



Assessment Communication

Profile sheets are developed to help to clearly communicate the assessment outcomes

- Summarized outcomes and issue statements are used to create profile sheets the sectors, asset categories, and specific geographies evaluated
- Draft profile sheets are provided to the working group for review and input before they are finalized and shared with others

CALPINE RUSSELL CITY ENERGY CENTER

Asset Description: The Russell City Energy Center (Energy Center) is a natural gas-fueled power plant that provides 619 megawatts (MW) of electricity to the Bay Area. The plant went online in August 2013 and has an expected lifespan of 40 years. The plant is owned and operated by CalPine, which sells the majority of its power to PG&E through operating agreements. The plant generates enough electricity for 600,000 residents and pays $5 million in taxes to the City of Hayward annually.

Key Issue Statement: The Energy Center is vulnerable to sea level rise impacts because of its reliance on water, access roads, and other utilities that are vulnerable to storm surge and sea level rise. Information about plant operations are not publicly available, which makes it difficult to adequately consider the plant in sea level rise adaptation planning. While the plant may not be vulnerable to more serious flooding impacts since it has an expected lifespan of only 40 years, the site will need to be cleaned up and/or protected as sea level rises.

Vulnerabilities

INFO: CalPine, a private entity, owns and operates the Energy Center, and management and operations plans are not publicly available, making it difficult to adequately assess the plant's vulnerability and risk.

FUNC: The Russell City Energy Center requires 2 million gallons per day of cooling water from Hayward Water Pollution Control Facility (HWPCF) and also discharges wastewater to the HWPCF. In addition, it relies on streets, roads, and highways for employee access. The dependence of the plant on potentially vulnerable utilities may cause the plant to be vulnerable before the plant itself is exposed to flooding, since the plant requires the cooling water and the road access to operate.

Consequences

Society and Equity: If the plant is shut down or moved due to sea level rise, 30 jobs may leave the area or disappear entirely.

Review and Confirm Project Scope

ART Contra Costa Project

Poster Session – 30 min

- Climate Impacts and Scenarios
- Community Services
- Industrial Campuses and Clusters
- Infrastructure and Utilities

Project Resilience Goals

Project resilience goals help guide the project

- Resilience goals help clearly define the desired project outcomes and lay a foundation for future decisions
- Setting resilience goals early ensures transparency, and that all understand desired outcomes at the outset
- A strong set of resilience goals reflect all four frames of sustainability

The ART resilience goal, developed with input from the Subregional Working Group, is to:

Increase the preparedness and resilience of Bay Area communities to sea level rise and storm events while protecting critical ecosystem and community services.

SOCIETY & EQUITY	ECONOMY	ENVIRONMENT	GOVERNANCE
Effects on communities and services on which they rely, with specific attention to disproportionate impacts due to existing inequalities.	Economic values that may be affected such as costs of physical/infrastructure damages or lost revenues during periods of recovery.	Environmental values that may be affected, including ecosystem functions and services, and species biodiversity.	Factors such as organizational structure, ownership, management responsibilities, jurisdiction, mandates, and mechanisms of participation that affect vulnerability and risk.

Project Resilience Goals

Functions and Values Mapping: Engagement Exercise

Goal: identify the functions and values within the project area that are important to consider when assessing current and future flooding

Draft resilience goals for the project

Maintain neighborhood function by preserving access to roads and transit, goods & services, safe & affordable housing, and outdoor recreation opportunities.

Maintain the function of the airport as a regionally significant passenger, cargo and employment hub.

Build resilience in all phases of the disaster lifecycle - from mitigation & preparedness to response & recovery - by protecting critical community facilities, supporting community awareness, ensuring assistance through mutual aid agreements, and building capacity for an effective recovery.

Preserve environmental quality by protecting endangered species, ensuring good water quality, and providing appropriate wildlife habitat.

Protect local and regional economy by preserving major employment centers, airport services, regionally significant transportation and local infrastructure investments.

Adapting to Rising Tides

Lindy Lowe
lindy.lowe@bcdc.ca.gov

Wendy Goodfriend
wendy.goodfriend@bcdc.ca.gov

Maggie Wenger
maggie.wenger@bcdc.ca.gov

Sara Polgar
sara.polgar@bcdc.ca.gov

www.adaptingtorisingtides.org/working-groups-overview