



# Rationale and processes of residential buyout programs: A review on buyout regulations and consequences in Japan and the U.S.

Ghezelloo, Yegane

Kondo, Tamiyo

Maly, Elizabeth

Stanley, Michelle

Meyer, Michelle

---

## (Citation)

Japan Architectural Review, 6(1):e12344

## (Issue Date)

2023-01

## (Resource Type)

journal article

## (Version)

Version of Record

## (Rights)

© 2023 The Authors. Japan Architectural Review published by John Wiley & Sons Australia, Ltd on behalf of Architectural Institute of Japan.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium,...

## (URL)

<https://hdl.handle.net/20.500.14094/0100482168>





# Rationale and processes of residential buyout programs: A review on buyout regulations and consequences in Japan and the U.S.

Yegane Ghezelloo<sup>1</sup> , Tamiyo Kondo,<sup>1</sup> Elizabeth Maly,<sup>2</sup> Michelle Stanley<sup>3</sup> and Michelle Meyer<sup>4</sup>

<sup>1</sup>Department of Architecture, Research Center for Urban Safety and Security (RCUSS), Kobe University Graduate School of Engineering, Kobe City, Japan;

<sup>2</sup>International Research Institute of Disaster Science, Tohoku University, Sendai City, Japan; <sup>3</sup>Department of Landscape Architecture and Urban Planning, Texas A&M University, College Station, Texas, USA <sup>4</sup>Hazard Reduction & Recovery Center Department of Landscape Architecture and Urban Planning, Texas A&M University, College Station, Texas, USA

## Correspondence

Yegane Ghezelloo, Department of Architecture, Research Center for Urban Safety and Security (RCUSS), Kobe University Graduate School of Engineering, 1-1 Rokkodai, Nada, Kobe City 657-8501, Japan.

Email: [yegane.ghezelloo@people.kobe-u.ac.jp](mailto:yegane.ghezelloo@people.kobe-u.ac.jp), [yegane.ghezelloo@gmail.com](mailto:yegane.ghezelloo@gmail.com)

## Funding information

Japan Society for the Promotion of Science, Grant/Award Number: R2904; JST SICORP, Grant/Award Number: JPMJSC2116; Kaken Grants-in-Aid, Grant/Award Number: 17H02070, 16K18202

Received December 21, 2022; Accepted February 20, 2023

doi: 10.1002/2475-8876.12344

## Abstract

Government acquisition of residential land has played a growing role in the reconstruction of housing in safer places and reduction of water-related risks. This paper explores how the rationales and processes of residential buyouts may result in different consequences for coastal recovery, mitigation, and residents' wellbeing referring to government documents and existing literature, we explored the characteristics of buyout programs in Japan and the U.S., identified consequences of mitigation and recovery, and deduced the effects of community buyouts. Our study revealed buyout programs could reduce risk exposure, enhance sustainable and resilient coastal rewilding, housing recovery, and building of community resilience. However, they could also contribute to limiting homeowners' opportunities to make their own choices to stay or relocate, the distribution of residents into unfamiliar communities, creation of checkerboard patterns of acquired properties, and un-utilized vast vacant lands. These results suggest that planners and disaster managers need careful consideration to redesign and manage property acquisition programs that not only increase regional resilience, but also are equitable for affected residents and utilization of acquired lands.

## Keywords

collective relocation, land use management for disaster risk reduction, managed retreat, residential buyout programs

## 1. Introduction

### 1.1 Residential buyouts after coastal water-related disasters

Communities face growing coastal hazard risks due to continued urbanization of coastal areas compounded by climate change. As a result, damage, losses, and overall costs from disasters are reaching catastrophic levels.<sup>1,2</sup> In addition to structural engineering solutions, land use management plays important roles for hazard mitigation, disaster risk reduction and the achievement of sustainable, livable, resilient recovery of the built environment. Among various tools for land use management for disaster risk reduction, including residential buyouts, managed retreat, collective relocation, and disaster insurance, this paper focuses on the consequences of residential buyouts on long-term recovery and mitigation processes. We assume that the design of different buyout programs can bring varied consequences for mitigation, recovery, and wellbeing of residents. From the perspective of post-disaster land use recovery policy in Japan and the U.S., this paper explores the rationales and processes of

residential buyout programs and reviews their differences and consequences. Japan has implemented buyouts as the largest scale in recent years, and although both countries are increasingly employing coastal buyout programs as mitigation methods against risk of coastal disasters, the design and implementation of programs differ.

This study asks: How does the design and implementation of buyout programs contribute to coastal recovery, disaster loss mitigation, and residents' wellbeing? What are the consequences of rationales and processes of buyouts on eligible and ineligible residents?

Drawing on existing literature and official documents, the first section of the paper clarifies the significance of buyout programs based on on mitigation, recovery, and residents' wellbeing. The second section explains the rationales, processes, and structures of buyout programs in the two countries, and the third section compares varied consequences of programs in the short and long term, and concludes with impacts and consequences of each country's buyout programs on mitigation, recovery, and residents' wellbeing.

## 1.2 Buyouts for mitigation

Hazard mitigation in coastal communities includes structural strategies such as increasing building code standards, retrofitting buildings, elevating housing, and engineering solutions for flood control such as dams, levees, and coastal dikes.<sup>3,4</sup> In addition, non-structural strategies such as land use planning and regulations, zoning, property acquisition, and the restoration of natural habitats have been growing in popularity and shaping community development patterns.<sup>5–7</sup> By buying properties at risk of repeated damage, post-disaster home buyout programs reduce vulnerability by facilitating the “permanent relocation of people and property away from known hazardous areas”,<sup>8,9</sup> which at the same time reduces government expenditures for costly future losses and expensive structural mitigation measures.<sup>4</sup> However, as the relocation of residents and removal of their property from residential use results in a reduction of property tax revenue, local governments may oppose post-disaster housing buyouts.

## 1.3 Buyouts for recovery

Although designed as mitigation programs, buyouts are a viable time for disaster recovery as an option for repair or reconstruction.<sup>10–12</sup> Buyout programs not only protect against decreased property values or costly mitigation requirements, but also present opportunities and financial support for homeowners to relocate to safer areas, as they may be able to receive a greater amount for their flood-damaged property through a government buyout compared to what they could sell it for on the market. Residents facing rebuilding decisions have themselves “viewed buyouts as a tool for household recovery”.<sup>4,13,14</sup> By converting residential land into parks or recreational uses, buyouts can benefit local communities through enhancing sustainability and livability.<sup>8,11,15,16</sup>

## 1.4 Buyouts for residents’ wellbeing

As residents are the main target of buyout programs, it is critical to evaluate these programs not only in terms of the implementation by cities and local jurisdictions, but also from the perspectives of residents’ wellbeing.<sup>8,9,11,15</sup> The level of residents’ wellbeing is related to people being able to interact in healthy social and physical environments that include them as a member and in contact with others.<sup>17–19</sup> A buyout process that is community-driven, considerate of locals’ needs, with a participatory implementation process, can improve the short-term and long-term wellbeing of the residents, and increase participation and public trust in the current and future buyout actions.<sup>14,20,21</sup> Adequate financial and structural support may help households perceive and experience the buyout as an opportunity to improve wellbeing. However, without adequate financial assistance, relocated residents might end up in areas of similar or higher hazard risk. Group relocation, affordable housing in less-vulnerable places, relocation assistance, and coordination between local and various levels of governments could ease the transition and improve residents’ wellbeing.<sup>22–25</sup>

## 2. Method

This paper explored the rationales and processes of residential buyouts in Japan and the U.S. through qualitative case study methods, with the primary focus on analysis of relationships between program design and consequences. Extended to this literature survey, that examined government documents and secondary data, we reviewed buyout programs in Japan and the U.S., and followed the respective governments’ steps in

the processes of provision and implementation of buyout programs. This program review helped us distill the different processes of two countries’ residential buyouts, and identify consequences on mitigation, recovery and residents’ wellbeing while showcasing post Great East Japan Earthquake and Tsunami (hereinafter GEJE) and 2012 Superstorm Sandy 2012 in the U.S.

Both Japan and the U.S. have implemented buyout programs for hazard mitigation and disaster recovery funded primarily by the national government. Both have also had catastrophic disasters in the past 15 years—that is, GEJE, hurricanes Sandy, Harvey, Maria – that led to large-scale population movement and expanded buyout programs. Yet, the varied buyout programs themselves and implementation provides an opportunity to compare and contrast the impact of different programming options.

## 2.1 Step 1: Analysis of residential buyout programs in Japan and the U.S.

Based on the analysis of official and government documents, we identified key characteristics of buyout programs in Japan and the U.S. and analyzed them in detail, examining and comparing rationales, eligibility, processes of buyouts, re-use of buyout properties, provision of managed retreat solutions, appraisal of buyout properties, and impacts on risk mitigation, disaster recovery, and residents’ wellbeing (Table 1).

## 2.2 Step 2: Comparison of key differences between buyout programs in Japan and the U.S., and rationales

After clarifying the key characteristics of the two countries’ buyout programs from step 1, we tried to identify reasons and rationales behind the main differences, and compared them through simplified process picturing, as along with showcasing the buyout programs after GEJE and 2012 Superstorm Sandy.

## 2.3 Step 3: Assessment

We drew cross-case comparisons from steps 1 and 2 with the literature review and identified the consequences of each program on mitigation, recovery, and residents’ wellbeing from the overall and corresponding parts of the programs. The identified negative effects are followed by suggestions from previous studies as well as real cases to help mitigate the consequences and increase goals of the buyout programs in each country and globally.

## 3. Results

### 3.1 Program design

#### 3.1.1 Japan

#### Rationale: Built-in community relocation project for risk reduction

Since buyouts in Japan are part of and included in collective relocation programs and projects, the rationale of residential buyouts is determined by implementation guidelines of these projects, whose stated objectives are “protecting lives and properties” and by Ministry of Land, Infrastructure, Transport and Tourism (MLIT).<sup>26,27</sup> Residential buyouts are a tool to promote collective relocation of a community, town, or several communities (the original eligibility criteria for a community to participate in a buyout program was 10 or more households)<sup>26</sup> to transform high risk areas to safer land by prohibiting new residential construction, across wider areas. Under

**TABLE 1.** Comparison framework for residential buyout programs in Japan and the U.S

Item		Question	Main resource documents
Buyout program design	Rationale	What is the rationale of the residential buyout program?	Governmental guidelines, documented info in related literatures
	Driver/conductor of buyout	Which organizations are the main drivers/conductors and fund providers the buyout program?	Governmental guidelines, review articles
	Eligibility	Individuals or collective groups of households?	
	Process of buyout	Is it voluntary or involuntary? Which comes first: government hazardous zone designation of hazardous zones or people's wishes?	Governmental guidelines, documented info in related literatures, case study publications
	Re-use of buyout properties	Who is allowed to re-use buyouts property?	Governmental guidelines, locally developed principles, case study publications
	Provision of managed retreat	Is new housing provided in an area for relocation? Is new housing based on individual relocation?	Governmental guidelines, documented info in related literatures, case study publications
	Appraisal of buyout property	Does the program pay the pre- or post-disaster valuation of property?	Governmental guidelines, locally developed principles, case study publications
Buyout program consequences		Risk mitigation	How does the buyout program impact future disaster loss mitigation?
	Review articles, case study publications, locally developed principles	Disaster recovery	How does the buyout program impact the disaster recovery process?
Residents' wellbeing		How does the buyout program impact the disaster affected community?	

Article 39 of Japan's 1950 Building Standards Law, collective relocation promotion zones are set within the hazardous zones.<sup>28,29</sup> Designated by the projects, collective relocation promotion zones are defined as "areas deemed unsuitable for residents to live within hazardous zones, and appropriate to be the zone to protect the lives, bodies, and property of individuals from disasters".<sup>27,30</sup> In addition to reducing exposure to hazards, stated intentions for collective relocation includes sustaining social ties and community.<sup>31</sup>

Collective relocation projects in Japan have mainly been implemented through post-disaster recovery programs, but they can also be applied as pre-disaster mitigation. The original idea of Article 39th of the Building Standards Law was to enhance the local robustness through land use regulations before disaster, a fact has been forgotten over time and due to local governments' regulatory initiatives.<sup>29,32</sup> Recently, the use of national treasury subsidies for pre-disaster collective relocation has started, in the face of the enormous damage after the 2011 GEJE tsunami, recent frequent flood damage, and the Nankai Trough Earthquake, which is predicted as very likely to occur in the short term. The City Planning Act of Japan was amended in 2020, and government efforts are being made to regulate new development in hazardous zones in accordance with compact city policy for Japanese society with its declining population [Note 1]. When acquiring new lots or building new homes, survivors could get a reimbursement for certain relocation expenses, such as moving costs and the buyout price of the land within a designated hazardous zone.

#### **Provision of land for managed retreat: Resettlement area secured and developed by the government**

Buyouts in Japan are part of government-driven collective relocation programs that deal with both former land and the provision of new residential lots. These programs include securing new land areas, site development for these resettlement areas, and the preparation of new residential lots that

residents can buy or rent, and use to rebuild their houses. The legal basis to implement buyouts and support relocation is the designation of the former land as hazardous, which allows the government to purchase it and provide new residential land for relocation.<sup>33–35</sup>

#### **Process of buyouts: Designation of hazardous zones, followed by voluntary buyouts**

The implementation process for buyouts starts with the prohibition of new residential construction in zones designated as hazardous, the designation of collective relocation zones, and then asking landowners' willingness to accept buyout offers. Hazardous zones are defined as "areas where disasters have occurred or are likely to occur due to heavy rains, floods, storm surges and other abnormal natural phenomena" in the Building Standard Act of Japan. While households cannot reconstruct their houses in the hazardous zones, they are not required to sell their land to the government, even if by participating in collective relocation projects they are gaining access to new residential land in safer areas. Article 22 of Japan's constitution states: "Every person shall have freedom to choose and change his residence to the extent that it does not interfere with the public welfare".<sup>36</sup> In other words, the government holds the right to buy land in the interest of the public good, and can also restrict the location of peoples' residence when this control contributes to the improvement of public welfare.

#### **Eligibility: Emphasizes collective relocation and land acquisition over individual relocation**

Japan has two government-supported relocation programs: collective relocation projects and relocation for buildings at risk near cliff areas that target individual households. Both projects provide financial incentives to relocate and include the designation of the former residential land as a hazardous zone, which means new residential construction is prohibited. The share of national subsidies for collective relocation is larger



than for individual relocation projects; the national government pays 75% of collective relocation program, and 50% for individual relocation programs with the rest paid by local governments. The major difference is that buyouts are included only for collective relocation projects, whose rules require that the government buys out all private parcels within collective relocation promotion zones unless absolutely necessary.<sup>27</sup> Conversely, if a community is not designated the collective group relocation, buyout programs available to the landowners.

#### **Reuse of buyout properties: Non-residential uses allowed**

Whether or not the government acquires residential properties as part of a buyout, new residential construction is prohibited on privately owned residential parcels in hazardous zones, as specified in Article 39 of Japan's 1950 Building Standards Law.<sup>29</sup> While the designation of a hazardous zone permanently prohibits the construction of new residential buildings, repairs to existing houses allowed, pre-existing residential buildings may remain, and commercial or industrial uses are allowed. Therefore after residential buyouts in hazardous areas, municipalities manage large amounts of publicly owned land acquired and rent it out to industries, members of private sectors, or individuals for non-residential uses.<sup>33,37</sup>

#### **Appraisal of buyout property: Post-disaster appraisal**

Implementation guidelines for collective relocation projects state that the rules regarding the purchase cost are "determined in consideration of the fact that the relocation promotion area is a dangerous area where a disaster may occur".<sup>27</sup> Whereas buyout properties in Japan are purchased for their post-disaster appraised value, this calculation is made by the government for the purpose of the buyout program; the post-disaster value does not necessarily reflect the lower value of this land (disaster-affected, and now with new residential use forbidden) on the private market.<sup>28</sup>

### **3.1.2 United States**

#### **Rationale: Buyout to eliminate costs from repetitive losses**

In the U.S., residential buyouts are incorporated in programs administered by the Federal Emergency Management Agency (FEMA): The Hazard Mitigation Grant Program (HMGP); the Pre-Disaster Mitigation (PDM) Program; the Flood Mitigation Assistance Grant Program (FMA); HUD's CDBG program buyouts; and the National Flood Insurance Program (NFIP). The purpose of all of these Hazard Mitigation Assistance (HMA) initiatives is "to reduce and eliminate, where possible, the long-term flood risk of structures including those insured by the federal National Flood Insurance Program".<sup>1,38</sup> Buyouts are the means of accomplishing managed retreat, "the purposeful, coordinated movement of people and assets out of harm's way".<sup>15</sup> FEMA explains that mitigation planning "breaks the cycle of disaster damage, reconstruction and repeated damage" and that the residential buyout program eliminates repetitive flood loss.<sup>39</sup> As Adler<sup>40</sup> explained, Congress established the National Flood Insurance Program (NFIP) to "reduce flood damages nationwide and ease the federal government's financial burden for providing disaster recovery." Residential buyouts and the NFIP share the common goal of reducing repetitive disaster losses.

Combined with other funding sources, FEMA buyouts have remained an important funding mechanism for both community relocation and other flood mitigation efforts.<sup>41</sup> Another major source of federal funding used to implement buyouts post-disaster is Community Development Block-Grants for Disaster

Recovery (CDBG-DR) from the Department of Housing and Urban Development (HUD). HMGP can fund 75% of the costs for land acquisition; the other 25% can come from local government funds or recovery funding such as CDBG-DR.

#### **Provision of managed retreat: No collective relocation supported by the government**

Buyouts in the U.S. are complete after one transaction—the purchase of privately-owned land by the local government agency managing buyout program.<sup>42</sup> In some cases, when properties are acquired as part of housing recovery programs, there may be incentives provided to homeowners to relocate within the state. However, buyout programs have no system to support residents' finding their next house. There are exceptional cases where new town developments were created for relocating residents, such as several buyout communities after the Midwest 1993 floods, and resettlements of communities in Isle de Jean Charles in 2020.<sup>43–45</sup> However, planning for post-buyout relocation of communities only occurs when there is additional support from other programs or organizations, and is not directly connected to government buyout programs. It should be noted that while FEMA and HUD programs provide funding and general guidance, local governments are ultimately responsible for implementing and overseeing floodplain buyouts which leads to variations in buyout programs depending on local contexts.

#### **Eligibility: Individual property owners or those within a community**

Buyouts in the U.S. focus primarily on individual property owners, but include various requirements and criteria for participation at the community scale. Properties that are in federal flood zones or have been damaged multiple times by floods could be considered eligible for buyouts, however program areas are decided by local governments, along with processes identifying eligible properties. For projects funded by FEMA HMGP, property must be in an NFIP participating community with a FEMA-approved Hazard Mitigation Action Plan. As several authors have explained, escalations of flood risk facing communities, exacerbating repetitive losses and the rise of NFIP debt required FEMA to shift their mitigation policy to buyouts.<sup>46,47</sup>

#### **Buyout processes: Statement of voluntary buyout first**

As a key feature of property acquisition programs in the U.S. is the requirement for each property owner's voluntary participation, the scale of the buyout boundaries is determined by residents' willingness to participate.<sup>48</sup> Unlike in Japan, U.S. national programs themselves do not have the authority to limit new residential construction, and residents in affected areas can rebuild or repair their houses in the same land, though the NFIP may decline to provide flood insurance to properties that are regularly damaged.

#### **Re-use of buyout properties: Prohibition of any private re-use except recreation or rewilding**

The objectives of buyouts are to "reduce the impact of future disasters while encouraging targeted revitalization efforts and public spaces; move people out of harm's way; restore natural function of floodplain, protect surrounding built environments, and provide additional green space".<sup>49</sup> HMGP forbids redevelopment of acquired land, except for recreational uses. For buyouts that use of CDBF-DR the recovery funds, as HUD states, "the grantee of CDBG-DR can use funds to buy properties with the intent to demolish the structures and create: park amenities, open space, or flood storage/overflow areas."<sup>49,50</sup>

### Appraisal of buyout property: Pre-flood fair market value of the land and structure

Using the HMGP program, which also restricts future land use, buyouts subsidized by the national government can compensate homeowners for their pre-disaster property value. As stated by HUD, “cities or counties participating in this program must purchase properties at the pre-flood fair market value of the land and structure”.<sup>49</sup> Implementing state or local governments therefore may offer homeowners who agree to participate in a buyout project up to the fair market value of the home before the disaster. In fact, the offer can exceed this valuation, as for example after Hurricane Sandy, when the State of New York provided bonuses of up to 15% of a home’s pre-storm price in an effort to increase participation in the buyout programs in targeted areas.<sup>7,51</sup>

### 3.2 Buyout program process and implementation: Actual cases from Tohoku and New York

#### 3.2.1 Step by step components of Japan’s buyout program

Figures 1 and 2 show systematic components of buyout programs and related examples of buyout programs implemented after 2011 GEJE and 2012 Superstorm Sandy in the U.S.

#### Program funder/conductor, covered expenses, and eligibility

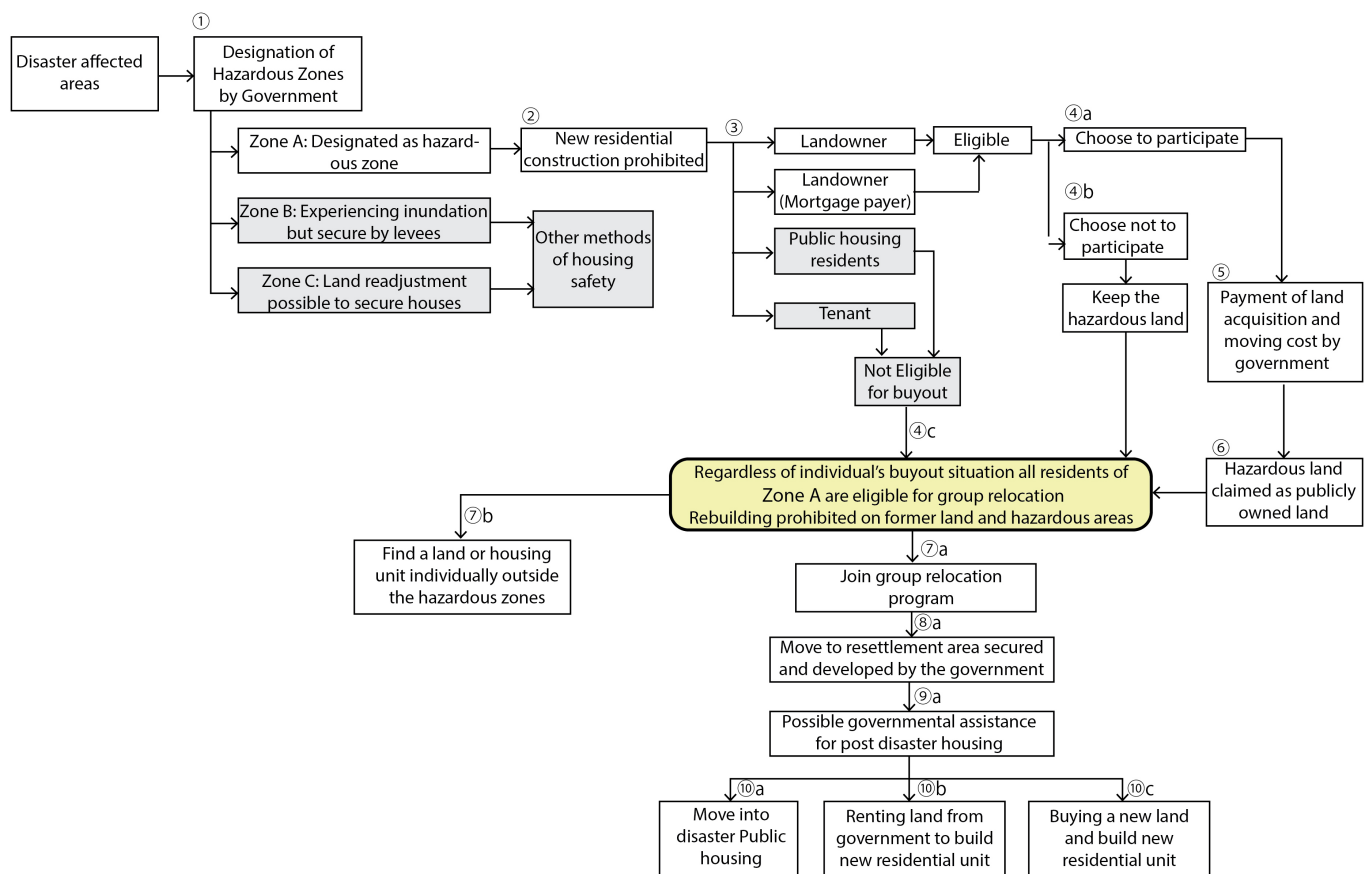
Buyouts in Japan are included as part of collective relocation projects, and are also a measure to implement land use restructuring plans.<sup>26</sup> The legal basis to justify buyouts and support

relocation is the designation of the land as hazardous, which allows the government to purchase this former residential land, as well as to secure new residential land for relocation (Figure 1, steps ① and ②).

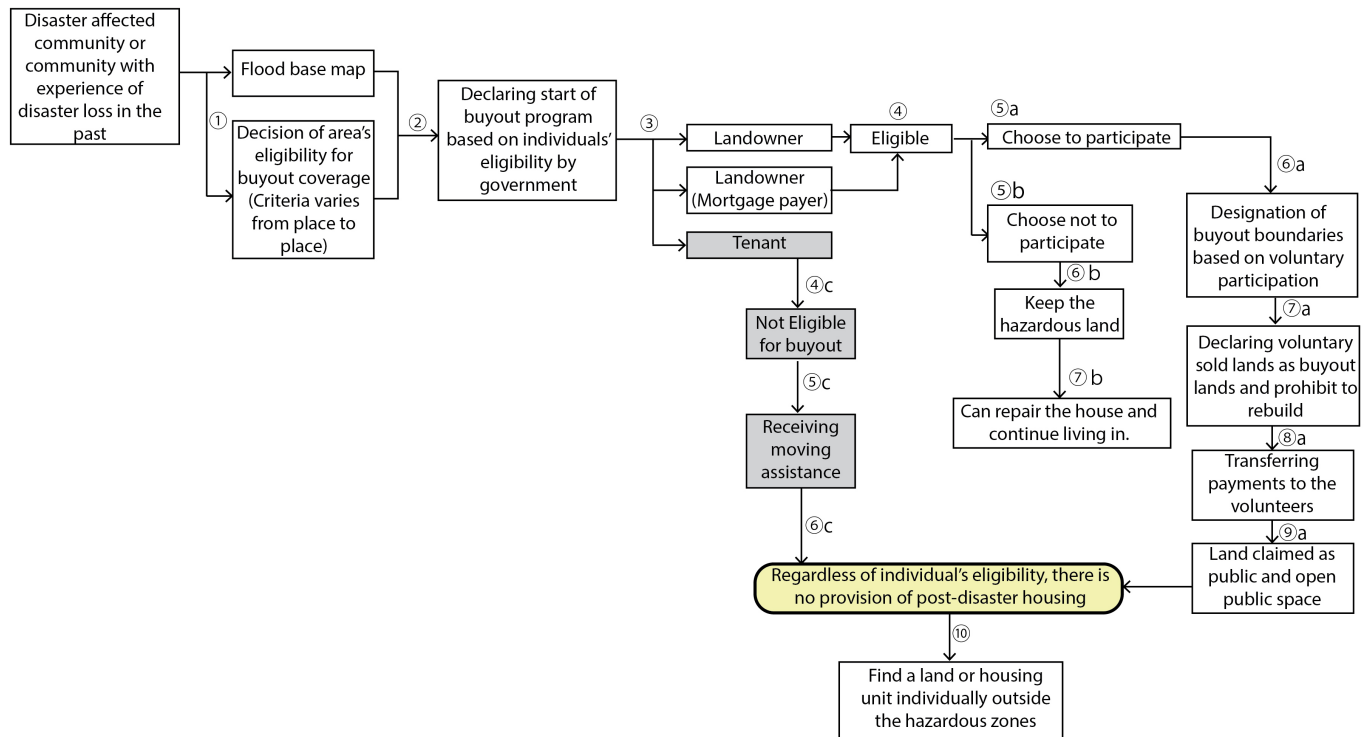
After the GEJE in 2011, Japan’s national government prepared and fully funded a menu of 40 types of recovery projects, including the construction of public housing, land readjustment, and collective relocation. As one of the main programs selected by a large number of municipalities, there were a total of 321 collective relocation projects carried out by municipalities in Iwate, Miyagi, and Fukushima Prefectures. Making up a central part of post-tsunami coastal retreat, residential buyouts and collective relocation projects in the Tohoku region include several interconnected parts. The process of implementing buyouts as part of collective relocation projects starts with designating land in coastal areas as hazardous. Then, municipalities ask residents about their willingness to participate in collective relocation projects. However, the original rule<sup>26</sup> for community eligibility for participating in buyout was relaxed to including community group formed of at least 5 households.<sup>52</sup>

#### Eligibility of properties, degree of mandatory/voluntary participation, and valuation of hazardous land

Eligibility for property acquisition is limited (with some exceptions) to collective community buyouts, as Japanese buyouts target risk reduction at the community scale.<sup>37,53</sup> In Japan, government purchase of private land as buyouts is justified as compensation for restricting the use of land, and therefore



**FIGURE 1.** Systematic process of the buyout program as part of the primary collective relocation for disaster mitigation program in Japan, authors



**FIGURE 2.** Systematic process of buyout program in the U.S., authors

property appraisal is done after disaster hits. This is demonstrated by the fact that habitable residential buildings are not the target of buyout in pre-disaster collective relocation projects.<sup>53</sup> The government provides buyout offers for individual parcels only after designating a hazardous zone and collective relocation promotion zone<sup>28</sup> (Figure 1, steps ③, ④a, ⑤).

Based on the real estate appraisal for standard residential land by the government, former owners of coastal land were offered approximately 80% of the pre-tsunami value for buyouts after the 2011 tsunami.<sup>54</sup> Japan's Land Expropriation Act generally requires compensation for incurred losses related to land acquisition. However, after the GEJE, the national government enacted the Act on Special Zones for Reconstruction, which enabled the deregulation of the rights holder agreement procedure required by the Land Expropriation Act.<sup>55</sup> As contradictory as these statements might appear, buyouts are voluntary. As a result, not every housing lot located in the hazardous zone or relocation promotion zone has been purchased by the government. Of all the residential parcels in the relocation promotion zone, the percentage of parcels that were purchased varies between municipalities, from 14.2% to 100%.<sup>56</sup>

#### Decision on hazardous land, use and ownership

Next, the government exerts their authority to restrict private land use rights in the interest of public welfare.<sup>28</sup> Japanese centralized urban planning led by the national government asserts eminent domain to control land use. Land in buyout areas in Japan is transformed uses that serve the public good, such as commercial, industrial, or recreational uses. For municipalities, logics of buyouts requires that benefits of the programs should be returned to the community.<sup>31</sup> There is a strong recognition of the need to make use of vacated land even in post-disaster contexts and depopulated regions with the

majority of the population concentrated in small areas (Figure 1, steps ④c, ⑤).<sup>28,42,53</sup>

With the variety of planned uses for land acquired by governments, former residential areas are converted to industrial or commercial uses, agriculture, coastal forests for tsunami reduction, or memorial parks. Local governments, for instance, rent land acquired in buyouts to members of the private sector for commercial or industrial use. As coastal forests slowed the speed of the 2011 tsunami and delayed its arrival time,<sup>57</sup> their role in mitigation has attracted increased attention since 2011 and some coastal land has been converted to green infrastructure.<sup>30</sup> Led by the national government, with a growing commitment to passing on the experiences and lessons of the 2011 tsunami to future generations, a significant amount of acquired coastal land by the government has been converted to memorial parks and museum facilities, including a large site in each of the three most affected prefectures of Iwate, Miyagi and Fukushima.

#### Decision about future housing, included services, effects on ineligible residents, and program timeline

Japanese relocation programs provide housing assistance in relocation site as well as help with moving for any members of community regardless of their participation in buyouts. This increases chances of community cohesion and prevents social isolation to some extent. Although, Japanese relocation and buyout programs cover many factors, the many steps and subsequent increased waiting time, may cause confusion and uncertainty for participants (Figure 1, steps ⑥, ⑦, ⑧, ⑨, ⑩).<sup>26,58</sup>

Municipalities then provide new residential areas to accommodate resettlement based on people's needs; residents have the option to rebuild their houses on new residential lots prepared by the government in higher and/or inland areas. The intention of collective relocation is to sustain and preserve

communities by relocating people together. However, actual types of resettlement patterns include different communities integrated into a single resettlement site; or communities divided into several resettlement areas.<sup>52</sup>

### 3.2.2 Step by step components of U. S. buyout programs

#### Program funder/conductor and covered expenses

In contrast to Japan, the objectives of buyouts in the U.S. is primarily to eliminate repetitive losses of property, as well as the costs required to compensate owners for these losses again and again.<sup>2</sup> Buyouts in the U.S. (Figure 2, step ①) are also connected to federal flood insurance policies and for projects funded by FEMA HMGP, as “the ultimate goal of the HMGP is to reduce the number of claims paid by the NFIP.”<sup>59</sup>

#### Eligibility of the area and owners

The focus of eligibility for property acquisition through buyout programs in the U.S. is on individual property owners, yet sometimes could approach communities.<sup>46,47</sup> While the U.S. buyout programs aim to protect people and properties by reducing risk exposure, as U.S. buyouts target individual properties for acquisition, reduction of loss and damage, may be at reduced scale (Figure 2, steps ②, ③, ④). The U.S. buyout process includes the acquisition of the land and the structures on the land, which are demolished following the buyout.<sup>60</sup>

After Sandy, New York State’s voluntary buyout and acquisition program “New York Rising” was established to purchase properties of interested homeowners and target areas where homes, residents, and emergency responders were regularly placed at-risk. The purpose of the buyout program was to increase the resiliency of the larger community by transforming parcels of land into wetlands, open space, or part of a stormwater management system, creating a natural coastal buffer to safeguard against future storms.<sup>61</sup>

#### Eligible property, mandatory or voluntary, and appraisal/valuation of hazardous land

In the U.S., justification for government purchase of private property is tied to the limitations of the NFIP to fully cover damage. When properties within the NFIP are damaged by floods, housing recovery programs implemented by local governments supplement the mitigation function of NFIP and cannot be as effective. Based on this logic, (Figure 2, step ⑤a) buyout properties are purchased for the pre-disaster value of the land and structure.<sup>40,46,47</sup>

New York State’s buyout program alone has purchased over 700 properties for more than \$271 million.<sup>60</sup> Approximately 93% of all expected demolitions of buyout properties had been completed by 2019.<sup>60</sup> The program requires that structures are removed and land be maintained in perpetuity for a use compatible with open space, recreational, or wetlands management practices.<sup>60</sup> Offers started at 100% of the property’s pre-storm fair market value plus available incentives up to 15%.<sup>60</sup> A 10% bonus was available in areas targeted for “enhanced buyouts,” with an additional 5% bonus for homeowners who relocated within the county. As a result of proactive organizing by local residents, three communities in Staten Island were successfully selected as enhanced buyout areas.

#### Decision on hazardous land, use and ownership after buyout

Following the disaster declaration of a community, the intent to carry out buyouts is set, with future land use restrictions put

in place (Figure 2, steps ⑥a, ⑦a, ⑧a, ⑨a, ⑤b, ⑥b, ⑦b) only for voluntary individual properties after they are acquired.<sup>60</sup> Where private property rights are fully respected, buyouts in the U.S. prohibit commercial or industrial land uses, instead rewilding buyout areas as a hazard buffer zone, an adaptation for long-term flood risk including coastal sea level rise.

The NY Rising Buyout Program purchased and demolished over 300 contiguous parcels (25.5. acres of land) in the Oakwood Beach neighborhood,<sup>60</sup> along with 2 other enhanced buyout neighborhoods nearby, Ocean Breeze and Graham Beach.

#### Decision on future housing and included services

In the U.S., the federal agencies oversee local government agency managing the buyout and communities by approving their plans for the funds, then the communities approach individual homeowners.<sup>49,51</sup> The program in the U.S. finishes after the payment is done and there is no consideration and assistance for the relocation destination and housing. U.S. program in contrast has fewer steps, but does not necessarily takes less time as it includes complicated processes within governmental bodies. These could lead participants to decide by themselves for the future permanent housing and community to avoid the inconveniences (Figure 2, step ⑩).

#### Effects on ineligible residents and timeline

Essentially, the implementation of buyouts in the U.S. is a real-estate transaction (Figure 2, steps ④c, ⑤c, ⑥c, ⑩).

### 3.2.3 Comparison of Japan and U.S.: Major differences and their reasons

The national buyout programs differ in several ways, not only due to variation in hazard risk or views around private property. Table 2 summaries the detailed components of two countries buyouts programs discussed here.

One of the key differences between buyout programs in the two countries is that buyouts in Japan are part of *collective relocation*, which is almost non-existent in the U.S. This emphasis on collective relocation then incorporates post-movement outcomes for individuals such as future provision of post-disaster residential units, as well as potentially maintaining social ties within neighborhoods. However this is not reflected through the processes and implementation of all buyout programs.<sup>52</sup>

Other major differences are that buyouts in Japan allow public access to commercial, recreational, and industrial services by permitting these uses within hazardous areas. In the U.S., on the other hand, buyouts aim to eliminate costs caused by repetitive losses by prohibiting *any* reconstruction on the obtained lands, and instead to provide disaster buffer zones by rewilding the hazardous lands.

### 3.3 Consequences (Japan and U.S)

The multifaceted roles and relationships between program design, reasons, and consequences of buyout programs in Japan and the U.S. are shown in Figure 3.

Japan approaches the safety of the hazardous lands, mitigating risk exposure of both properties and lives by relocation assistance, and emphasizing protection of community ties by providing community scale buyout and group relocations sites. While buyout programs offer land value to voluntary participants, the government also provides relocation and housing assistance for those who decided to sell as well as who kept



**TABLE 2.** Components of two countries' buyout programs

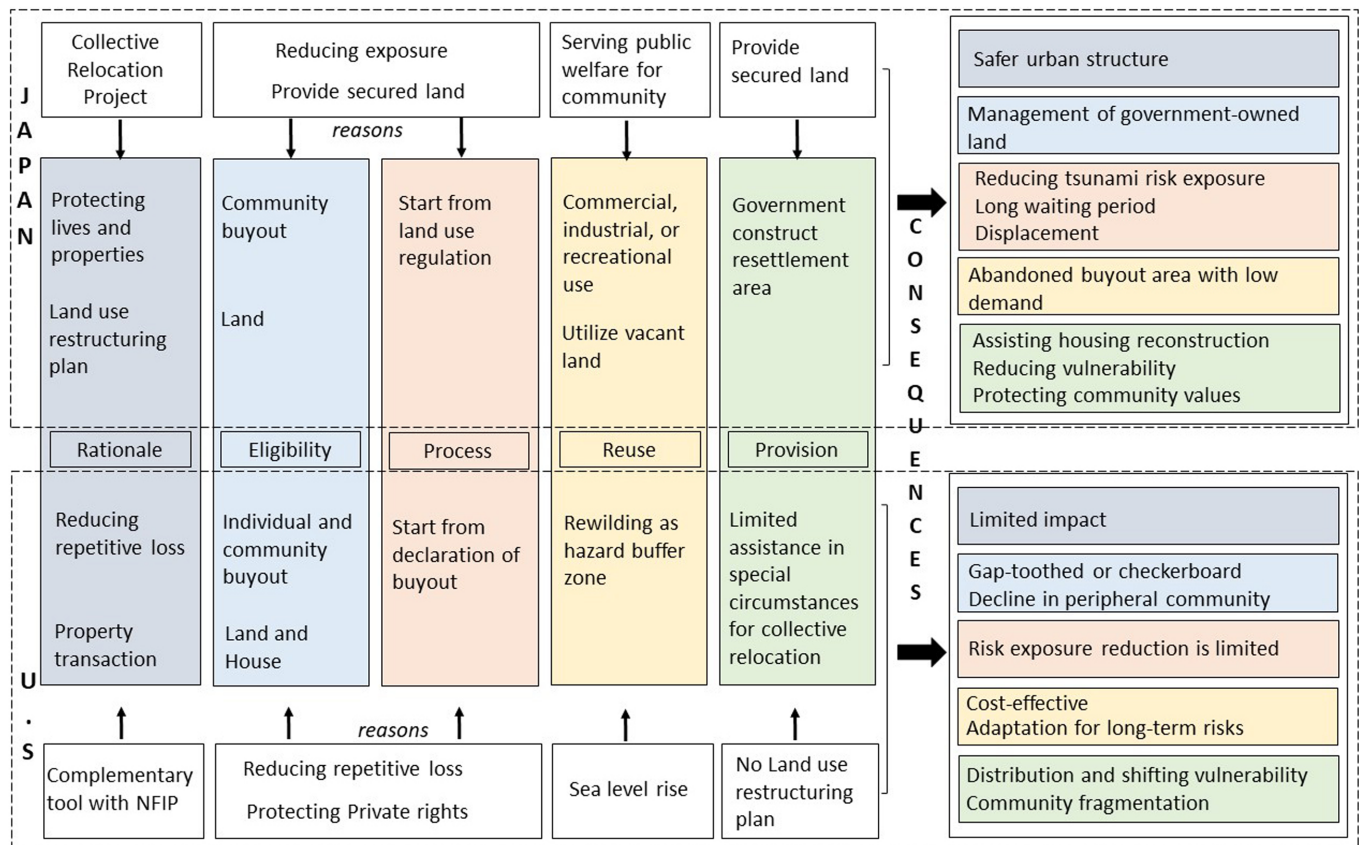
Components	Japan	USA
Program funder and policy maker	Different levels of government and agencies: MLIT, reconstruction agency, local governments	Different levels of government and agencies: FEMA, HUD municipal/county/state governments
Covered expenses	Land, management costs, percentage of value, moving assistance	Valuation of hazardous land
Eligibility	Collective relocation of community members. Individual households are not eligible	Individual homeowners. Community buyouts are rare
Eligible residents	Only landowners (and mortgage payers). Renters and public housing residents are not included	Only landowners (and mortgage payers). Renters and public housing residents are not included
Eligible property	Land	Land and home structure
Mandatory or voluntary	Different levels of government and agencies: MLIT, reconstruction agency, local governments	Different levels of government and agencies: FEMA, HUD municipal/county/state governments
Appraisal/valuation	Post-disaster value	Pre-disaster fair market value
Valuation of the destination land	Differs based on financial and housing assistant options	Future land is not included
Decision on hazardous land	Residential rebuilding or new residential construction prohibited, regardless of participation in buyouts. Housing repairs allowed in residents choose to stay. Recreational, commercial, industrial uses allowed	Natural and open space for hazard buffer zone No reconstruction of any type allowed post-buyout Residents can repair and reconstruct if not participating in buyout
Ownership of land after buyout	Local governments	Local (municipal, county, or state) government
Decision on future housing	Collective relocation site determined Assisted group relocation, different types of housing available Regardless of buyout eligibility and participation everyone can move to relocation site to rent or purchase new land and housing units	Not included
Included services	Land value to participants Relocation site and housing development for those joining group relocation (regardless of buyout) Process finishes after moving to relocation sites	Process finishes when the buyout amount is transferred to the individuals
Effects on ineligible residents	Eligible for group relocation and housing assistant	No resources provided
Timeline	Multiple steps, part of a bigger program that increases overall waiting period for participants to receive the buyout and relocation services	Few steps in general, being complicated, involving multiple levels of governments, Process finishes when the fee is transferred to the participants

their original lands in hazardous zones. Japan's buyout program also offers support in moving costs to reduce the affordability issues for vulnerable groups.<sup>27</sup> While, preparation of group relocation sites requires a longer timeline for moving to permanent housing, it can potentially protect community ties, prevent residents' separations, and provide safer urban structures for destination housing. By converting lands acquired and now owned by the government into commercial space, recreational spaces, and industrial services, Japan's programs can result in increased public access to the lands. However, lands in hazardous areas are in low demand for reconstruction, still at risk of future disaster loss, and uses require governmental land management and budget provision.<sup>29,33,37</sup>

In contrast, the main approach of the U.S. buyout programs is to reduce costs of disaster aid and the NFIP through buyouts of properties that are repeatedly damaged ("repetitive loss"). Buyout programs target hazardous zones and only cover the cost of land and structures for those homeowners who voluntarily agree to participate. The future housing situation of the residents after they joined the buyout program is uncertain, and as U.S. buyouts exclusively focuses on saving lives and properties in the hazardous areas and mitigation of the risk exposure in those areas, participants post-relocation

disaster safety in destination areas is unknown.<sup>1,15,39</sup> The buyout process finishes by transferring the costs for the buyout property to participating landowners, resulting in relatively fewer steps of process and waiting period compared to the Japanese program: 321 collective relocation projects have been completely finished in March 2020, 9 years after the tsunami.<sup>62</sup>

The U.S. buyout programs could be effective for long-term disaster mitigation and future loss in known hazard zones by prohibiting reconstruction and only permitting rewilding and converting of the properties into parks and open spaces.<sup>39,49</sup> However, since not all residents choose to join the voluntary program, it can result in a checkerboard pattern of acquired lands. Also, with no major consideration of relocation destinations and housing assistance, financially vulnerable groups of residents will struggle with finding new housing and moving expenses. The lack of housing support will also increase social and disaster vulnerability of communities, because (1) when affordability is a priority, housing safety could be compromised; (2) affordable housing may only be available in socially vulnerable neighborhoods<sup>63–65</sup>; (3) moving out of a familiar community causes fragmentations and results in loss of social support and connection; and (4) unforeseen destinations of



**FIGURE 3.** Multifaceted roles and consequences of residential buyouts programs in Japan and the U.S., authors

future housing could result in increase of disaster vulnerability, and exposure of relocated residents.

In both countries, there is no direct considerations for renters, and buyout programs only target landowners. However, in Japan as part of collective relocation or as a separate support option for survivors, disaster recovery public housing could enhance housing opportunities for the residents ineligible for the buyout programs.

#### 4. Discussion: Negative Effects of Buyouts

Previous studies have documented the overall negative impacts of buyouts for people, including: large-scale redistribution and shifting of vulnerability; lack of transparency; disproportionate retreat in low-income or minority communities; losses in the physical environment that impact the sense of safety; and threats of long-term financial losses associated with post-buyout land use decisions over which residents have no control.<sup>8,11,15,34,35</sup>

In Japan, negative impacts can be drawn from the scale of the buyouts as well as process. In GEJE case studies, many scholars have examined the consequences of implemented collective relocation and buyout programs in Tohoku region of Japan. Suzuki and Kawasaki<sup>56</sup> explain the interrelated challenges related to the collective relocation promotion zone, including difficulties for land maintenance, a “checker-board of government and private-owned land in the hazardous zone” and lower demands for land in depopulated and rural areas.<sup>56</sup> Buyouts and the decisions for the use of acquired lands could be costly. The lengthy process and waiting time to move to

permanent housing in relocation areas are another negative effect of buyout programs in Japan.

Miyasada and Maly<sup>66</sup> pointed out that due to long waiting period in temporary housing even with provision of relocation site and completion of housing recovery, residents of the Ogatsu fishing village in Japan did not return to their community after moving to other areas, which caused additional population decline.

Scholars<sup>67</sup> suggest that three problems for recovery in the Ogatsu area include: physical separation between survivors caused by outmigration after the designation of the hazardous zone areas; social class separation between people who relocated individually without government projects and those survivors waiting for long-term collective relocation projects; psychological distance and separation between communities,<sup>67</sup> and subsequently decreased wellbeing of the communities.

On the other hand, in the U.S. and through our review, we found that buyouts could contribute to exacerbating social inequities and environmental injustice by only targeting homeowners, along with community fragmentation and limiting survivors’ opportunities to choose to stay or relocate by prohibiting residential use in hazardous zones.<sup>22,61</sup> In the U.S. lack of moving and housing assistance, as well as long waiting periods (similar to Japan) can increase participants’ withdrawal from buyout programs.

Finally, in order to address the distribution of vulnerability and inequality and increase wellbeing of the residents, this study recommend the local authorities to increase regional resilience by suggesting safe areas for relocation destinations, as well as increase safety in the hazardous areas. In addition,

the buyout programs should offer equitable modifications for affected residents and provide safe post-disaster housing and moving assistance for vulnerable residents, minorities, and low-income groups regardless of homeownership.<sup>22,68</sup> In response to community fragmentations and preserving social values and community ties, buyout programs should consider voluntary collective relocation of communities to safer sites and conduct the programs based on a community-driven process and participation of the residents.<sup>20,21,60</sup>

## 5. Conclusion

The review between Japan and the U.S. enabled us to distill the characteristics of buyout programs and different impacts in both countries, and understand how design of the varied buyout programs result in specific consequences. This article explored the effects of buyouts on mitigation, recovery, including sustainable and resilient coastal rewilding, increasing safety against future disasters, and enhancing residents' wellbeing. In light of the multifaceted role of residential buyouts emerging throughout long-term recovery processes, these results suggest that planners and disaster managers need careful consideration to design and manage property acquisition programs that not only increase regional resilience but also are equitable for affected residents. Authorities need to consider redesigning of buyout programs, paying more attention during implementation phases, and other adaptation which could minimize negative effects. In addition, results of this research could not be reflected from all cases, and do not clearly demonstrate the actual implementation and relationships between buyouts and consequences of mitigation, recovery, and residents' wellbeing. In other words, there may be other influencing factors in the actual cases determining results of mitigation, recovery and wellbeing.

Future research on implementation of buyout programs and their long-term impact requires listening to the actual experiences of the residents and the collection of the direct opinions of the disaster survivors in order to evaluate recovery and wellbeing consequences in the actual case studies from Japan and the U.S. Although we suggest strategies to minimize negative effects of buyout programs, but there is need for feasible adaptive strategies to avoid these negative impacts through programs' application as well as recovery of the acquired lands in the hazardous areas. Additional review and evaluation of in cases from Japan after the 3.11 disaster and the U.S after hurricanes Katrina and Sandy is still needed understand the emerging and ongoing processes, observe adaptive strategies, and review the long-term outcomes of implementation.

## Acknowledgements

None.

## Funding Information

This research was made possible through the support of and by the JSPS Grant No. R2904 in the Program for Fostering Globally Talented Researchers, Kaken Grants-in-Aid # 17H02070, 16K18202, and JST Japan-US Collaborative Research Program, Grant Number JPMJSC2116, Japan, and Kobe University grant for promoting international joint research (220125に修正).

## Disclosure

No potential conflict of interest was reported by the authors.

## Data Availability Statement

Data not available.

## Note

Note 1) Please read: section 1 Regulation of Development (Article 29 through Article 52) [https://www.japaneselawtranslation.go.jp/en/laws/view/3841#je\\_ch3sc1at1](https://www.japaneselawtranslation.go.jp/en/laws/view/3841#je_ch3sc1at1).

## References

- Kihlslinger R, Salvesen D. *Floodplain Buyouts: An Action Guide for Local Governments on How to Maximize Community Benefits, Habitat Connectivity, and Resilience*; 2018. <https://www.eli.org/sites/default/files/eli-pubs/actionguide-web.pdf>
- Godschalk D, Beatley T, Berke P, Brower D, Kaiser E. *Natural Hazard Mitigation: Recasting Disaster Policy and Planning*. Island Press; 1999.
- Godschalk D. Urban hazard mitigation: creating resilient cities. *Nat Hazards Rev*. 2003;4(3):136-143. doi:10.1061/(ASCE)1527-6988(2003)4:3(136)
- Greer A, Binder SB. A historical assessment of home buyout policy: are we learning or just failing? *Hous Policy Debate*. 2017;27(3):372-392. doi:10.1080/10511482.2016.1245209
- Burby RJ. *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*. The National Academies Press; 1998:366.
- Freudenberg R, Calvin E, Tolkooff L, Brawley D, Ebook Central Academic C. *Buy-in for Buyouts: The Case for Managed Retreat from Flood Zones*. Policy Focus Series. Lincoln Institute of Land Policy; 2016.
- David Salvesen TKB, Kamrath C, Ganser B. *Are Floodplain Buyouts a Smart Investment for Local Governments?* 2018. <https://www.coastalreview.org/wp-content/uploads/2018/09/Project-Report-Floodplain-Buyout1.pdf>
- DJ MG, Binder SB, Albright EA. First, do no harm: evaluating the vulnerability reduction of post-disaster home buyout programs. *Nat Hazards Rev*. 2020;21(1):11. doi:10.1061/(asce)nh.1527-6996.0000337
- Koslov L, Merdjanoff A, Sulakshana E, Klinenberg E. When rebuilding no longer means recovery: the stress of staying put after hurricane Sandy. *Clim Change*. 2021;165(3):59. doi:10.1007/s10584-021-03069-1
- Smith GP, Wenger D. Sustainable disaster recovery: operationalizing an existing agenda. In: Rodríguez H, Quarantelli EL, Dynes RR, eds. *Handbook of Disaster Research*. Springer; 2007:234-257.
- Binder SB, Ritchie LA, Bender R, et al. Limbo: the unintended consequences of home buyout programmes on peripheral communities. *Environ Hazards Hum Policy Dimens*. 2020;19(5):488-507. doi:10.1080/17477891.2020.1714537
- Binder SB, Greer A, Zavar E. Home buyouts: a tool for mitigation or recovery? *Disaster Prev Manag*. 2020;29(4):497-510. doi:10.1108/Dpm-09-2019-0298
- Frey N. Place satisfaction and perceived recovery after hurricane Sandy on Staten Island's East Shore. *Environ Hazards Hum Policy Dimens*. 2018;17(1):40-55. doi:10.1080/17477891.2017.1340869
- Graham L, Debucquoy W, Anguelovski I. The influence of urban development dynamics on community resilience practice in New York City after superstorm Sandy: experiences from the lower east side and the rockaways. *Glob Environ Chang*. 2016;40:112-124. doi:10.1016/j.gloenvcha.2016.07.001
- Siders AR. Managed retreat in the United States. *One Earth*. 2019;1(2):216-225. doi:10.1016/j.oneear.2019.09.008
- Barile JP, Binder SB, Baker CK. Recovering after a natural disaster: differences in quality of life across three communities after hurricane Sandy. *Appl Res Qual Life*. 2020;15(4):1151-1159. doi:10.1007/s11482-019-09722-3
- Field J, Field J, National Institute of Adult Continuing Education. *Well-Being and Happiness*. IFLI Thematic Paper 4. National Institute of Adult Continuing Education; 2009:50.
- Atoba K, Newman G, Brody S, Highfield W, Kim Y, Juan A. Buy them out before they are built: evaluating the proactive acquisition of vacant land in flood-prone areas. *Environ Conserv*. 2021;48(2):118-126. doi:10.1017/s0376892921000059
- Merriam SB, Kee Y. Promoting community wellbeing: the case for lifelong learning for older adults. *Adult Educ Quart*. 2014;64(2):128-144. doi:10.1177/0741713613513633
- Schwaller NL, Campbell L, Nguyen MT, Smith G. (Mis)trusting the process: how post-disaster home buyout processes can degrade public trust. *Nat Hazards*. 2022;111(3):2681-2702. doi:10.1007/s11069-021-05153-2
- Zavar E, Fischer LA. Fractured landscapes: the racialization of home buyout programs and climate adaptation. *Curr Res Environ Sustainability*. 2021;3:100043. doi:10.1016/j.crsust.2021.100043
- Siders AR. Social justice implications of US managed retreat buyout programs. *Clim Change*. 2019;152(2):239-257. doi:10.1007/s10584-018-2272-5



- 23 Holder A, Flanagan ST. The bureaucratic encounter and shifting social constructions among migrant youth during the DACA application process. *Adm Theory Prax.* 2020;**42**(3):319-339. doi:10.1080/10841806.2019.1678356
- 24 Kraan CM, Hino M, Niemann J, Siders AR, Mach KJ. Promoting equity in retreat through voluntary property buyout programs. *J Environ Stud Sci.* 2021;**11**(3):481-492. doi:10.1007/s13412-021-00688-z
- 25 Clay PM, Colburn LL, Seara T. Social bonds and recovery: an analysis of hurricane Sandy in the first year after landfall. *Mar Policy.* 2016;**74**:334-340. doi:10.1016/j.marpol.2016.04.049
- 26 Implementation Guideline for the Collective Relocation Project. <https://www.mlit.go.jp/crd/chisei/boushuu/youkou17main.pdf>
- 27 Implementation Guideline for the Collective Relocation Project; 1973.
- 28 Kondo T, Lizarralde G. Maladaptation, fragmentation, and other secondary effects of centralized post-disaster urban planning: the case of the 2011 "cascading" disaster in Japan. *Int J Disaster Risk Reduct.* 2021;**58**:102219. doi:10.1016/j.ijdrr.2021.102219
- 29 The Building Center of Japan. <https://www.bcj.or.jp/>
- 30 Ichinose T. Green Infrastructure in Reconstruction After the 2011 Earthquake and Tsunami: A Case Study of Historical Change on Awaji Island in Japan. In: Yan W, Galloway W, eds. *Rethinking Resilience, Adaptation and Transformation in a Time of Change*. Springer, Cham; 2017.
- 31 Explanation Materials of Collective Relocation Project. <https://www.mlit.go.jp/toshi/content/001414762.pdf>
- 32 Kodama C, Kubota A. Study on the idea of land use regulation focusing on article 39 of the building standards law. *J City Plan Inst Jpn.* 2013;**48**(3):201-206. doi:10.11361/journalcpj.48.201
- 33 Matsumoto E, Ubaura M. A study on designation disaster hazard areas after the Great East Japan Earthquake. *Great East Japan Earthquake Tsunami: Lessons Land Use.* 2015;**50**(3):1273-1280. doi:10.11361/journalcpj.50.1273
- 34 Minezaki Y, Kikuchi M, Tsuchikawa Y, Yamasaki S, Oosawa M. Characteristic of the promotion plans for utilizing vacant land under the land readjustment project in the reconstruction city area after the Great East Japan Earthquake. *J City Plan Inst Jpn.* 2019;**54**(3):1109-1115. doi:10.11361/journalcpj.54.1109
- 35 Minezaki Y, Kikuchi M, Tsuchikawa Y, Osawa M. Characteristic of the measures for providing land information of the sites implemented the disaster prevention group relocation promotion projects. *J City Plan Inst Jpn.* 2020;**55**(3):918-924. doi:10.11361/journalcpj.55.918
- 36 *The Constitution of Japan*; 1946. <https://www.japaneselawtranslation.go.jp/en/laws/view/174>
- 37 Kondo T, Karatani Y. 41 Spatial planning for housing recovery after the Great East Japan Earthquake. *Spatial Planning and Resilience Following Disasters: International and Comparative Perspectives*. Policy Press; 2016. doi:10.1332/policypress/9781447323587.003.0003
- 38 Peterson K, Apadula E, Salvesen D, Hino M, Kihlsinger R, Bendor TK. A review of funding mechanisms for US floodplain buyouts. *Sustainability.* 2020;**12**(23):10112. doi:10.3390/su122310112
- 39 Residential Buyout Program Eliminates Repetitive Flood Loss. FEMA; 2021. <https://www.fema.gov/openfema-data-page/hazard-mitigation-grant-program-property-acquisitions-0>, <https://www.fema.gov/case-study/residential-buyout-program-eliminates-repetitive-flood-loss>
- 40 Adler D, Burger M, Moore R, Scata J. Changing the National Flood Insurance Program for a changing climate comments. *Environ Law Rep News Anal.* 2019;**49**(4):10320.
- 41 Shabman L, Riley A, Stedje G. *Evaluation of Floodplain Permanent Evacuation Measures: An Alternative Approach for the US Army Corps of Engineers*. US Army Corps of Engineers; 1997.
- 42 Maly E. Housing recovery and displacement from Fukushima: five years post-nuclear meltdown. *Adv Nat Tech Haz Res.* 2018;**47**:205-225. doi:10.1007/978-3-319-58691-5\_13
- 43 Pinter N, Rees JC. Assessing managed flood retreat and community relocation in the midwest USA. *Nat Hazards.* 2021;**107**(1):497-518. doi:10.1007/s11069-021-04592-1
- 44 Pinter N, Ishiwatari M, Nonoguchi A, et al. Large-scale managed retreat and structural protection following the 2011 Japan tsunami. *Nat Hazards.* 2019;**96**(3):1429-1436. doi:10.1007/s11069-019-03602-7
- 45 Simms JRZ, Waller HL, Brunet C, Jenkins P. The long goodbye on a disappearing, ancestral Island: a just retreat from isle de Jean Charles. *J Environ Stud Sci.* 2021;**11**(3):316-328. doi:10.1007/s13412-021-00682-5
- 46 Salvesen D. *Voluntary Buyouts as Hazard Mitigation; Implementing Buyouts*. FEMA Training Material; 2004. <https://training.fema.gov/emiweb/downloads/breakingdisastercycle/session%204%20revised-ppt.pdf>
- 47 Hayat BM. Addressing affordability and long-term resiliency through the National Flood Insurance Program. *Environ Law Rep.* 2015;**45**:10338-10349.
- 48 Mach KJ, Kraan CM, Hino M, Siders AR, Johnston EM, Field CB. Managed retreat through voluntary buyouts of flood-prone properties. *Sci Adv.* 2019;**5**(10):eaax8995. doi:10.1126/sciadv.aax8995
- 49 CDBG-DR Buyout Program Guidelines. HUD; 2021. [https://files.hudexchange.info/resources/documents/Disaster\\_Recovery\\_Buyout\\_Program\\_Guidelines.docx](https://files.hudexchange.info/resources/documents/Disaster_Recovery_Buyout_Program_Guidelines.docx)
- 50 McDonnell S, Ghorbani P, Desai S, Wolf C, Burgoyne DM. Potential challenges to targeting low- and moderate-income communities in a time of urgent need: the case of CDBG-DR in New York state after superstorm Sandy. *Hous Policy Debate.* 2018;**28**(3):466-487. doi:10.1080/10511482.2017.1385504
- 51 OpenFEMA Dataset: Hazard Mitigation Grant Program—Property Acquisitions. FEMA; 2020. <https://www.fema.gov/openfema-data-page/hazard-mitigation-grant-program-property-acquisitions-0>
- 52 Operation of Urban Development Projects in Areas Affected by the Great East Japan Earthquake (Guidance), translated from “東日本大震災の被災地における市街地整備事業の運用について(ガイダンス)”. City Bureau, Ministry of Land, Infrastructure, Transport and Tourism; 2012:1-6.
- 53 Maly E. *The Role of Residential Buyouts in Post-Disaster Housing Recovery Support a Comparison of Recent Cases from Japan and the United States*. Vol. 18. Looking at the World History of Planning; 2018. doi:10.7480/iph.2018.1.3780
- 54 *The Great East Japan Earthquake Recovery Assistance Q & A*. Japan Federation of Bar Associations; 2012.
- 55 Kaneko Y. Loss compensation and judicial access in the post-disaster recovery in Asia. *J Int Coop Stud.* 2015;**22**(2):1-42.
- 56 Suzuki R, Kawasaki K. A study of utilization of the sites implemented group relocation promotion projects for disaster mitigation in Iwate, Miyagi and Fukushima. *Rep City Plan Inst Japan.* 2018;**16**(4):310-316. doi:10.11361/reportscpij.16.4.310
- 57 Ohira H, Hayashi A, Yamashita K, Imamura F. Tsunami damage mitigation effect by multiple defense system using coastal forest in Iwanuma city. *J Jpn Soc Civil Eng Ser B2 (Coast Eng).* 2016;**72**(2):I\_1459-I\_1464. doi:10.2208/kaigan.72.i\_1459
- 58 Subsidy grant outline for Collective Relocation Project. <https://www.mlit.go.jp/toshi/content/001414764.pdf>
- 59 FY15 Hazard Mitigation Assistance Guidance Fact Sheet. 2015.
- 60 Community Development Block Grant Disaster Recovery-Funded New York Rising Buyout and Acquisition Program. New York State; 2019. <https://www.hudog.gov/sites/default/files/2019-04/2019-NY-1001.pdf>
- 61 State of New York Governor's Office of Storm Recovery. <https://stormrecovery.ny.gov/housing/buyout-acquisition-programs>
- 62 MLIT. *All Construction of Residential Land by Group Relocation in the Great East Japan Earthquake Will Be Completed*. MLIT; 2021. <https://www.mlit.go.jp/report/press/content/001331839.pdf>
- 63 Loughran K, Elliott JR, Kennedy SW. Urban ecology in the time of climate change: Houston, flooding, and the case of federal buyouts. *Soc Curr.* 2019;**6**(2):121-140. doi:10.1177/2329496518797851
- 64 Loughran K, Elliott JR. Unequal retreats: how racial segregation shapes climate adaptation. *Hous Policy Debate.* 2022;**32**(1):171-189. doi:10.1080/10511482.2021.1931928
- 65 Loughran K, Elliott JR. Residential buyouts as environmental mobility: examining where homeowners move to illuminate social inequities in climate adaptation. *Popul Environ.* 2019;**41**(1):52-70. doi:10.1007/s11111-019-00324-7
- 66 Miyasada A. Impacts of collective housing relocation in the Ogatsu area of Ishinomaki City after the 2011 Great East Japan Earthquake and Tsunami. *IOP Conf Series: Earth Environ Sci.* 2021;**630**(1):012014. doi:10.1088/1755-1315/630
- 67 Tanishita M, Abe A, Arai N, Sasaki S, Miyazaki M. Workshop: discussing the hazardous zones after the 2011 tsunami. *Jpn J Real Estate Sci.* 2018;**31**(4):164-175. doi:10.5736/jares.31.4\_164
- 68 *Resilient Neighborhood East Shore, Staten Island*. New York City; 2017. <https://www1.nyc.gov/assets/planning/download/pdf/plans-studies/resilient-neighborhoods/east-shore/summary-report-east-shore.pdf>

**How to cite this article:** Ghezelloo Y, Kondo T, Maly E, Stanley M, Meyer M. Rationale and processes of residential buyout programs: A review on buyout regulations and consequences in Japan and the U.S. *Jpn Archit Rev.* 2023;**6**:e12344. <https://doi.org/10.1002/2475-8876.12344>